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## Automatic Signals on the Boston &amp; Albany.

The Boston & Albany Railroad has now about 150 miles of double track equipped with continuous overlapping blocks of automatic signals, and all of its main line stations (except those covered by interlocking) furnished with a signal each side to protect a train standing at the station.

The present arrangement of the block signals is part of a comprehensive plan adopted some years since after an exhaustive detailed study of the conditions and needs of the whole line.

The plan pursued was to divide the road into sections of a few miles in length (the points of division depending on local circumstances, but principally on the grade and alignment), then each of these sections was considered by itself with reference to (1) the length of the section, to determine the number of signals that should

and the location of the block signals was decided upon accordingly.

Automatic signals had already been put on about 20 miles of double track, and a number of station blocks beyond, but this was an independent section and had no reference to anything else. When, however, the question of the further extension of the system came to the front, there were seen to be three courses open for adoption, viz.:

1. To begin at once the signalling of those portions of the road where the traffic was densest and the conditions most exacting and to cover each year such a portion of the road as could be paid for, leaving the remainder without any protection whatever.

2. To provide for the protection of the most dangerous portions of the road in the order of their importance, each being taken care of without reference to any other; or

3. To draw up a general scheme of signalling for the whole road and carry the plans far enough into detail to make certain that no important consideration was overlooked, and enter upon the construction as soon as the plan was completed.

The latter course was the one adopted. To have constructed immediately all the work laid out, would have cost a very large sum of money—much more than was then or since available at one time, but it was determined that whatever was done from time to time—be it much or little—should be parts of the comprehensive scheme, and the only changes that would ever be required should be such alterations as were necessary to convert a detached system into a continuous one, or to change the spacing of the signals, by the interpolation of others between those first erected, when the increase of traffic made that desirable.

Since this plan was adopted no work has been done in automatic signal construction, except in accordance therewith, but while often the points selected for equipment have been wide apart (being taken according to their relative importance), each signal set up was so located and arranged that although many are now only detached independent signals, each protecting some dangerous point, yet when the gaps are filled, these will be found in their proper places as parts of a continuous series, and it will only be necessary to change the connections.

The points selected for the beginning of the work and the order pursued were:

1. The blocking of the 20 miles of double track before referred to, at the Boston end of the road where the traffic was heaviest, then taking in the following order—

2. Junctions of branch lines where the amount of business did not warrant their early equipment with interlocking.

3. The most important yards and transfer points, where a large amount of switching was done.

4. Facing point switches and crossovers where these could not be conveniently turned end for end, so as to make them trailing switches, and the Canaan tunnel, the only one on the line.

5. The protection of all other crossover switches; this incidentally provided block signals for many stations where they would not otherwise have been then put in, as most of the crossovers were at or near stations.

6. Such stations as were not equipped under the preceding head were provided with station block signals in the order of their importance.

7. Outlying switches, with either automatic or (mechanical) semaphore signals, according to circumstances.

8. Continuous blocking of portions of the line, beginning with those most important, or where collisions were most likely, as on the steep grades, or where most trains were running. The signals on these portions were set at the longest distances apart which it was thought possible without delaying traffic.

9. There only remained the continuous or detached blocking of other portions of the line in the order of their relative importance.

10. And, last of all, putting intermediate signals between these already set up, where these were so sparsely located that the increase of traffic since their erection caused them to delay trains.

The ideal system would permit the running of trains at the maximum speed and the minimum distance apart, without ever stopping a following train at an automatic signal except when the distance between that and the preceding train was less than the prescribed limit. The capacity of such a system is reached when the time required for a train to pass through a block is just equal to the least time allowed between trains. Any increase of traffic then requires an increase of speed, or a shortening of the blocks, or the abandonment of the use of the system, in the manner here called for, and the destruction of its most valuable protective features.

The work above outlined was carried on as circumstances permitted, sometimes at several different points at once, but in general accordance with the plan indicated, and since its adoption scarcely a signal

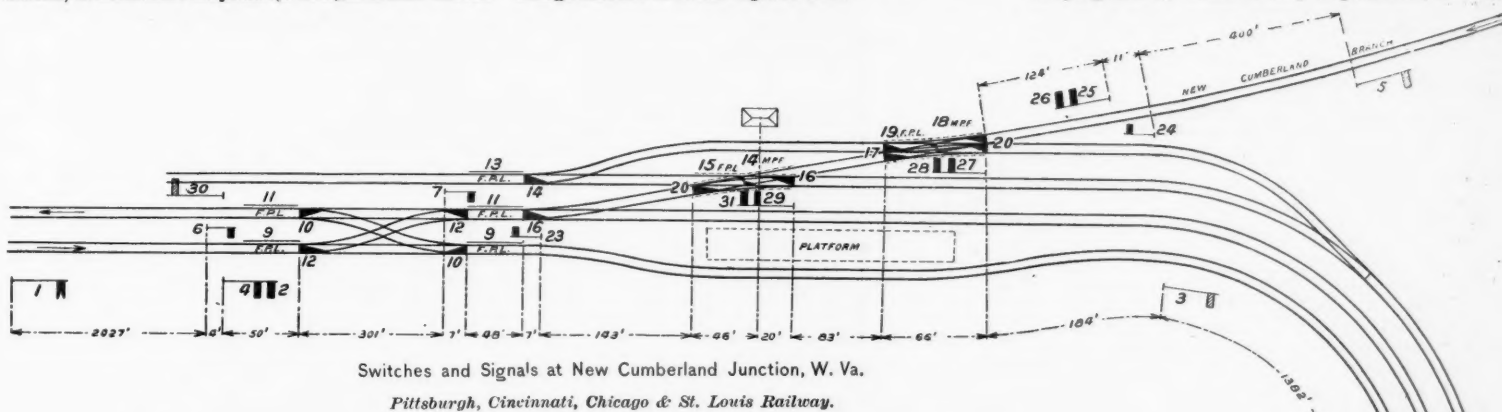
has been moved from its original location—even when the detached blocks in the vicinity have been converted into continuous ones—the exceptions being for the most part where the tracks or switches that the signals were designed to protect have themselves been changed.

The above was in general the plan followed, and it is believed to be a simple and normal one. It provides for an indefinite increase of the number of signals without any re-arrangement of the system by subdividing the blocks as may be found necessary, and those already erected will still be in their right places.

Signals thus located, if the system itself be chosen with due regard to the conditions automatic signals ought to fulfill, give the maximum protection such a system can afford, at the minimum cost. I do not think it equal to Sykes' lock and block system when this is used with a continuous rail circuit (which is seldom done); but this last is exceedingly costly to install and to maintain, as are also the manual block systems. An automatic signal of the best form can be erected for from one-fifth to one-third the cost of a manual one, and maintained for perhaps one-eighth or one-sixth as much, and with trainmen properly instructed, an automatic signal with a rail circuit overlapping the next signal a sufficient distance is, in my judgment, as reliable and efficient as a manual one costing several times as much.

The choice is not usually to be made between the two systems, but for most railroads between one which costs less and can perhaps be afforded—at least for the most dangerous points—and one which costs so much as to be practically out of the question for all American roads except the largest and most prosperous; between a system fulfilling the most essential requirements of an absolute block system, with some advantages peculiar to itself, and none at all; between one which can be maintained in a state of very high efficiency, with some defects (the extent and importance of which are now pretty well understood and can be almost absolutely guarded against), and *nothing*—between a very perfect protection at a moderate cost, and no protection at all.

It is my belief that more safety can be secured and a greater facility for operation by spending a certain limited sum of money for automatic signals than for manual ones, provided always that only the best systems be chosen and that they be installed and operated with the safeguards that experience has shown to be necessary. Were the question approached from this point of view, the use of automatic signals would be much more general than it is, with a corresponding gain in safety and economy of operation. It would not then be the rule, as it now too often is, to equip perhaps a few junctions or terminals with signalling apparatus, and leave entire divisions carrying a heavy traffic wholly unprotected; it would



be located therein; (2) the alignment and grade of the track within these limits; (3) the permissible speed of trains; (4) the number of trains now running or likely to be run on this part of the road and their probable distribution through the 24 hours. [Each of these items has an important bearing on the number and arrangement of block signals on that section of the road.] (5) The position of the stations, turnouts, cross-overs, etc., and the train movements necessary to be provided for in the vicinity; (6) the location of the block signals with regard to the uniform spacing of trains, and also to secure to approaching trains a good view of the signal for a distance before reaching it sufficient to allow the train to be brought to a stop, or at least under control before reaching the signal; but since in times of fog or severe storms a long view cannot be had, it was considered necessary to locate those protecting switches, etc., so far from the point of danger that a train could be stopped, even under unfavorable conditions, between that point and the signal should the latter be suddenly discovered showing danger.

The plan comprehended the equipment of the entire road for a very dense traffic. Had the only consideration been to provide such protection as would suffice for the need then existing, the problem would have been much more simple and a much less complete and elaborate plan would have been adopted; somewhat less costly, too, in the sense of requiring, perhaps, fewer signals to be erected at that time, but more costly in the end because of the changes that would have been afterward required when the traffic should have outgrown the capacity of the signal system.

The principle which prevailed was that the plan should be comprehensive enough to take care of all the traffic that might ever be reasonably expected to go over the road,

not happen, as it has many times in recent years, that passenger trains are run following each other at a high rate of speed in a fog under two or three minutes' headway, with no safeguards at all, except the uncertain and delusive flag carried back by a rear brakeman, who may go a few yards or half a mile, or if he does his whole duty, may be too late to save a collision. One accident, such as we can all recall, prevented in a generation, will equip and maintain a whole division with automatic signals; a single life saved would, on a money basis, pay for ten such signals; one injury prevented might maintain them forever.

GEO. W. BLODGETT,

## Interlocking at New Cumberland Junction.

Those of our readers who are interested in signaling will recollect that recently (March 27) we gave an illustrated description of some of the standards in force on the Pennsylvania lines west of Pittsburgh for erecting fixed signals. As a matter of more practical interest we show herewith a concrete application of the theories there prescribed, in the shape of a diagram of the signals recently erected by Mr. Grafton at New Cumberland Junction, W. Va., on the Pittsburgh, Cincinnati, Chicago & St. Louis. It will be remembered that the signaling practice on the lines on which these standards are in force is different from that on most other roads, in two particulars; three-position semaphore signals are

freely used and all posts carrying signal arms which govern movements through interlocking plants invariably have at least two arms, a false or "dummy" arm being used where only one is needed to control the movements of trains.

The typical diagrams in our former article showed the three-position signals by themselves (Figs. 18 to 23), and the other figures, showing switches, had none of them; but in the diagram now shown the use of both kinds of signals in the same plant is illustrated. Signals 3, 5 and 30 are called train-order signals, and are three-position. It will be observed that an engineman does not encounter either one of these until he has passed all the switches, so that the absence of the second arm is always an indication that the signal gives him leave to proceed "right-away," as the Englishmen call it, to the next station. They, however, would call this a starting signal, and we cannot see that the American term is any improvement over that. There are no fixed arms at New Cumberland Junction. If there were a switch to the left of signal 30 (for instance) that signal would have two arms, even though the switch were trailing and there were therefore only one possible route to take; and then the three-position or starting signal would be placed beyond the switch. Likewise the post carrying signals 2 and 4 would have two arms, even if there were no facing-point cross-over; and the lower arm would be fixed in the horizontal position.

The three-position signals are always worked by rods, never by wires. The intermediate position, with the lever at the middle of the sector, being used to give trains the right to proceed to the next station, the distant signal is not locked by this lever while it is in that position, but only when it is in the stop position.

It will be observed that there are dwarf signals for all reverse or "back-up" movements, but with only one arm in each case. No indicators are used. It is now a settled principle, we believe, on the Pennsylvania lines both east and west of Pittsburgh, to provide only one arm for slow-speed diverging movements, whether there be two or more than two. Experience with signals thus arranged, so that information, as to which one of two or more tracks the switch is set for, must be given to the engineman by hand or lamp signal, has fully confirmed the view that the added arms which were until within a few years deemed necessary are a needless complication and expense.

#### The Minimum Dimensions of a Rail.

The engraving, Fig. 1, shows, full size a rail section sent to us by Mr. Torrey, Chief Engineer of the Michigan Central. Of this Mr. Torrey says:

"I inclose a section cut from a rail which has been in service on a team delivery track, ballasted with cinders, surrounded with all sorts of rubbish, upon which refrigerator cars have been loaded daily for quite a long time. Very likely you have had such samples brought to your notice before, but I am somewhat surprised to see how slight a neck would sustain a heavily loaded car."

In 1870 (issue of Nov. 12) we printed an account of some experiments made by Baron von Weber, which have become classical. That portion of the article which bears on the case of Mr. Torrey's rail is reprinted below, with one of the engravings. The least thickness of the web of the Michigan Central rail is about 0.07 in. and it is hardly necessary to point out the fact that the top and bottom numbers are reduced far below the section experimented on by von Weber.

"Baron von Weber desired to ascertain what was the minimum thickness which could be given to the web of the rail, in order that it might still possess a greater power of resistance to lateral forces than the fastenings by which it was secured to the sleepers. For this purpose a piece of rail 6 ft. in length, rolled of the best iron, was supported at distances of 35.43 in., and loaded nearly to the limit of elasticity (which had been determined previously by experiments on other pieces of the same rail) and the deflections were then measured with great care by an instrument capable of registering thousandths of an inch. This having been done, the web of the piece of rail was planed down, and each time that its thickness had been reduced three millimeters, the vertical deflection of the rail under the above load was again tested, and the rail was subjected to the following rough but practical experiments.

"The piece of rail was fastened to twice as many fir sleepers by double the number of spikes which would be employed in practice and a lateral pressure was then applied to the head of the rail by means of a lifting jack, until the rail began to cant and the spikes were drawn. The same thing was then done by a sudden pull, the apparatus used being a long lever fastened to the top of the rail. The lifting jack and the lever were applied to the ends of the rail, and the web of the latter had in each case to resist the whole strain required for drawing out the spikes.

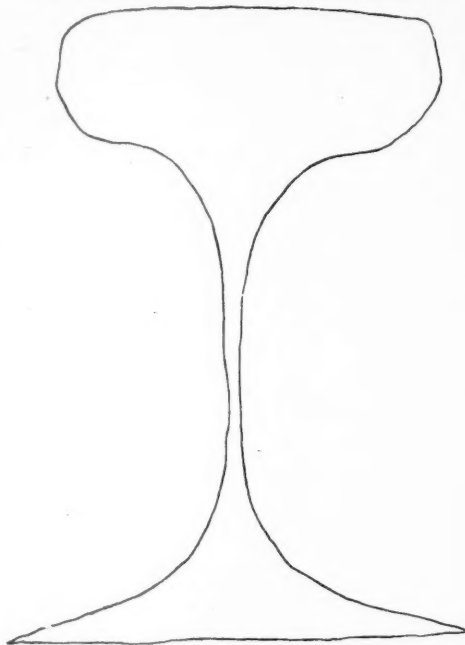
"The results of the experiments made to ascertain the resistance of the rail to vertical flexure with different thicknesses of web, and under a load of 5,000 lbs. were as follows:

Thickness of web.	Vertical deflection.
15 millimetres = 0.9 in.	0.016 in.
12 " = 0.47	0.016
9 " = 0.35	0.019
6 " = 0.24	0.0194
3 " = 0.12	0.022

"These results showed ample stiffness, even when the

web was reduced in thickness to 0.12 in. To determine the power of resistance of the rail to lateral flexure, an impression of the section was taken in lead each time that the spikes were drawn. The forces applied in these experiments were greater than those occurring in practice, yet it was found that with the web 12, 9 and even six millimetres thick, no distortion took place, and only when the thickness of the web was reduced to three millimetres (0.12 in.) was a slight permanent lateral deflection of the head caused just as the spikes gave way. Fig. 2 shows a section of the rail after the web had been planed down to 3 mm.

"Next a rail with the web reduced to 3 mm (0.12 in.) in



A Badly Corroded Rail—From the Michigan Central.

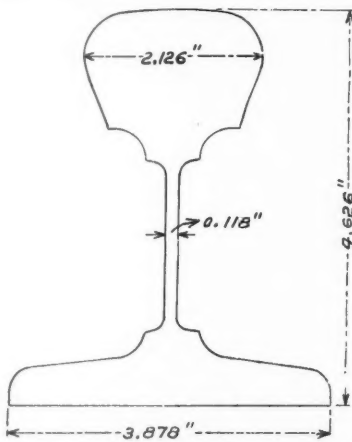
thickness was placed in the line leaning to a turntable on the Western Railroad of Saxony, where it has remained until the present time, receiving more than 100 times daily the shocks due to engines passing to and fro from the turntable.

"It follows from these experiments that the least thickness ever given to the webs of rails in practice is more than sufficient, and that if it were possible to roll webs  $\frac{1}{4}$  in. thick, such webs would be amply strong if it were not that there would be a chance of their being torn at the points where they are traversed by the fish-plate bolts. Baron von Weber concludes that webs  $\frac{1}{4}$  in. or  $\frac{1}{2}$  in. thick are amply strong enough for rails of any ordinary height, and that in fact the webs should be made as thin as the process of rolling and as the provision of sufficient bearing for the fish-plate bolts will permit."

#### Municipal Ownership of Street Railroads.

This is the subject of two papers which were read at the last annual meeting of the National Municipal League at Baltimore, one by Mr. Charles Richardson, of Philadelphia, in favor of municipal ownership and operation, and one by Mr. Frank M. Loomis, of Buffalo, against that proposition.

Mr. Richardson began by taking it for granted that in



Von Weber's Experiment with a Thin Web.

the larger cities of the United States better service could be given at much lower rates than those now in force. Statistics are not always easy to get, and in many cases the facts have been disguised by leases, stock watering and deceptive accounting, but it is easy to show that in some cases the regular guaranteed net rentals or dividends of leased lines exceed 60 per cent, and that the stocks sell at prices showing that the owners realize 1,200 per cent. profit. Experience in Detroit, Toronto, Glasgow and Berlin shows that fares might be reduced 30 or 40 per cent, and still leave a liberal margin of profit. Exorbitant prices are not the only evil, however. Our street railroads have been a factor in accustoming the people to regard wholesale corruption as a matter of course. In Philadelphia there are 70,000 stockholders or persons

otherwise interested who favor the street railroads as against the public.

Stern measures must be adopted in dealing with the companies. Persuasion may be postponed until the time when lambs can persuade wolves to become vegetarians. By the use of money, in well-known ways, men of influence who might otherwise be good citizens, are hypnotized, while the general public is beguiled by plausible misrepresentations and by the introduction of mechanical improvements which recent inventions have rendered inexpensive. To try to control the corporations without destroying them would require business sagacity, expert knowledge, public spirit and incorruptible integrity, qualities which are not conspicuous in our local authorities.

The success of some European cities in controlling corporations without buying them up is urged as a reason for trying such methods here, but it is to be remembered that there is an active, intelligent, civic spirit in those cities, and that the lowest classes of the people are excluded from the lists of voters. Moreover, there is in those cities a tendency to resort to direct municipal operation as being better than the control now exercised. Municipal operation is also being discussed in this country, and it is our most hopeful remedy. But while the people may exercise their right of eminent domain, there should be no violation of law or equity, and private property should not be taken for public use without fair compensation.

Some of the most obvious arguments for municipal ownership and operation of street railways are (1) that as public streets are public property the public is entitled to all revenues and all benefits which can be obtained therefrom; (2) that with anything like honest management the business would permit of better service and much lower fares for the people, as well as better treatment, shorter hours and higher wages for the employees; (3) that the construction of lines for merely speculative purposes and the unnecessary opening of streets would be avoided; (4) that opportunities for the rapid accumulation of large fortunes by stock watering and stock gambling would be materially diminished; (5) that better and cheaper service would greatly promote the growth and prosperity of our cities, and (6) that the final abolition of wholesale bribery and corruption would terminate the antagonisms which now exist between the interests of large sections of the people, and would open the way for a gradual elevation of our standards of public and private morality and business methods.

The only serious objections seem to be that municipal operation is an untried experiment, and that it would strengthen the spoils system. Is it a new experiment? The principle is precisely the same as that of the operation of schools, gas works and water-works, by cities and of the post office and other departments by the general government. It is only an extension of an old principle.

As to the spoils system, it may be questioned whether it is possible for its results to be more completely attained in any case than they have already been in some instances. Many existing companies are political machines of the most effective and dangerous character, and while their wealth and unscrupulousness and the support of stockholders and investors may make their power for evil greater than that of a partisan machine or a business department of a city government, they differ from the latter in being beyond the reach of a popular vote and but slightly amenable to public opinion. There is another argument. The greatest difficulty in the way of improving our municipal conditions is the indifference of the voters.

The lack of interest in local contests is especially characteristic of that very large proportion of voters who are wage-earners living in cities and paying no direct taxes. In national elections they can be interested in tariffs and monetary problems as affecting their wages, their chances of employment, or the prices of their food and clothing. But in local contests they fail to see that the results can be of importance to themselves, and they either avoid the polls or allow their votes to be determined by a trifling gift, a promise of work or a mere request from professional politicians. The problem is to convince such voters as these that they have a strong personal interest in placing their public business in the hands of honest and capable men. Is there any better or more effective way of doing this than to make each individual feel that his vote at a local election may have a direct effect in raising or lowering all the car fares which he has to pay for himself and his family? Is there anything which will do more to make the average citizen or wage-earner appreciate the importance of judicious voting than the knowledge that every conductor who collects a fare, instead of being the servant of an irresponsible corporation, is only the agent and employee of officials chosen by the people who use the cars? The way to make the people take an interest in their government is to make it touch them as directly and as often and at as many points as possible. The rapid progress of civil service reform and good business management in our national government has been rendered possible by a degree of popular support which could not have been obtained if the government had been less interesting to the people, or had only affected them in fewer and less obvious ways. Will not the voters be more careful in the selection of their agents when they can feel that it is their ox and not that of the capitalist which is being goaded? Is there not reason to believe that in our dread of political corruption we have been too timid about measures which would tend to bring the people face to face with the vicious methods of the spoils system? Under our form of government the surest way to remedy an evil is to make everybody feel it, and then put those who are guilty within the reach of their victims. Municipal ownership and operation of street railways, considered from this point of view, is a powerful agency for the development of civic spirit, the elevation of popular standards, the adoption of business methods, the political education of the masses, and the final overthrow of the spoils system.

Mr. Loomis opened with the avowal that he did not use the term "Socialism" in a stigmatising sense. The words "municipal control" are very loosely used, many persons making no distinction between municipal ownership, with direct operation of monopolies, and municipal control. The time-worn, but time-honored, argument still holds; municipal ownership removes the incentive to individual enterprise. The protest against government operation with a horde of office holders, against which the civil service reformers would contend in vain, is equally well founded. Individual enterprise must be fostered in order to make each individual in the community work out his own salvation. The fittest must and ought to survive. The term "natural monopoly" is often misapplied. Railroads, gas and electric lighting companies and all corporations are creatures of the law and are artificial monopolies. The advocates of municipal ownership and operation claim:

1. A cheapening of the product of manufacture and a reduction of the cost and charge for the semi-public service rendered.

2. An improvement in the quality of the product and better public service.

It is urged that competition being impracticable in the monopolized industry, the community ought to monopolize it rather than leave it in the hands of a favored few. This, as I understand it, is urged as the only efficient method by which equality of right can be secured in the absence of competition.

It has never been shown, and in the very nature of things never can be shown that the public can manufacture a better article or render a better service at a less cost than a private corporation or an individual capitalist. Statistics are shown as to the relative cost of production, but it is doubtful whether the municipal book-keeping on which these statistics are based takes any account of interest on investment, of repairs and renewals, of damages paid, or of the taxes which would have been paid to the municipality by a private corporation doing the business. But granting the correctness of the statistics, they only prove that with the element of profit eliminated the product can be sold at less charge to the consumer than if the monopolist is left free to charge his own price. . . . But the community as a whole cannot be benefited by establishing a system under which gas, water, fuel or transportation is furnished at a price from which the element of profit is eliminated.

Many people conclude that with the possibility of competition excluded, there is no remedy except for the municipality to go into business on its own account. This is a singular error. Our monopolies, being artificial, would, if deprived of the power given by the people, cease to exist. Monopolies are the result not of natural conditions, but of legislation favorable to their growth. The remedy is to be found not in the creation of a larger, a municipal or national corporation which shall swallow up the smaller ones, but by restoring to the people of each community the power to regulate absolutely the operation of any franchise among them. The warrant for the exercise of this power, different from and in excess of what could rightfully be exercised over the individual citizen, is to be found, not in any fanciful assumption that the franchise is a "natural" monopoly, but in the fact that the monopoly has been created and sustained by the special privileges granted to it by the people, different from and in excess of those enjoyed by the individual citizen.

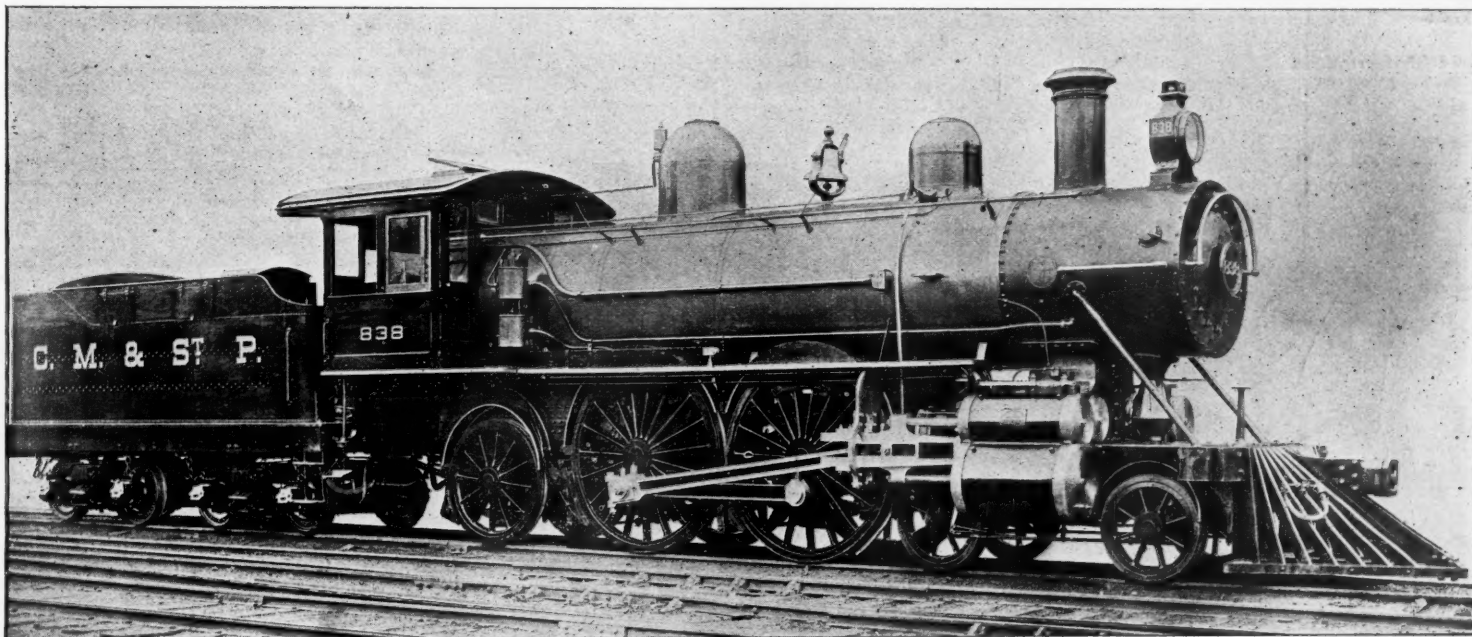
This then is the remedy—a remedy based not on theory alone, but which has been found wonderfully effective in solving the very questions which now confront us, and nowhere more effective than in democratic France under universal manhood suffrage. It is distinctively democratic, especially as compared with the municipal socialism which is making such rapid strides in Germany to-day. It offers the only escape from that condition which Herbert Spencer so aptly terms "the coming slavery." Socialism, the tyranny of the masses, is no less to be dreaded than monopoly, the tyranny of the classes.

At the meeting of the league last year I took occasion to direct attention to the manifold advantages of the democratic system of municipal government in European cities as compared with our autocratic system, and was met with the rejoinder that the people of free America could not be trusted to rule wisely through the agency of an unsalaried council elected by popular suffrage. To-day those who distrust the ability of the people to protect their own rights under a democratic system come to the front with a proposition to turn over to the people not only the control of that which is their own, but a moneyed interest in that which is not and ought not to be theirs. Passing strange it is that in free America the democratic features of European municipal government are deprecated as unsafe, while an open welcome is given to the insidious advances of the socialist. . . . Democratic home rule is the one effective remedy for municipal ills.

#### Compound Passenger Locomotives for the St. Paul.

The engraving shows one of two fast passenger locomotives recently built by the Baldwin Locomotive Works for the Chicago, Milwaukee & St. Paul Railway. These engines are Vaucelain compounds; the general dimensions follow.

Gage of road.....	4 ft. 8½ in.
Cylinders diameter.....	H. P. 13 in. L. P. 22 in.
Stroke.....	26 in.
Driving wheels.....	78 in. diam.
Total wheel base.....	25 ft. 6 in.



Four-Cylinder Compound Passenger Locomotive for the Chicago, Milwaukee & St. Paul Railway.

Built by the BALDWIN LOCOMOTIVE WORKS, Philadelphia.

But, it will be said, this power already exists, and it is not exercised. Not so. The people, through their representatives in the Legislature, have a certain limited control of the situation, but there is nothing even approximating that democratic Home Rule which would solve the problem for us as it has in democratic France.

We have not in any substantial sense municipal control as distinguished from legislative control. There is not, for instance, any power vested in the municipalities to fix by ordinance the rates which shall be charged by street-railway companies. The municipal authorities have no power, as in France and some other European countries, to examine the books of gas companies and other monopolies, and fix the amount of their charges on the basis of the net earnings as shown by an examination of their business. Some opponent says that this course would not prove effective with corrupt city officials. Make no mistake. It is easy, comparatively easy, to pass an unjust bill affecting only a particular locality through the Legislature by the corrupt use of money, because the bulk of the Legislature cannot be made directly amenable to the wrath of the injured voters. It is easy to control the actions of local officials with money. But this again is due largely to the fact that the limitation on their powers gives them the very excuse wanted for making the best bargain obtainable. But suppose, for example, that absolute power was vested in the local authorities to fix the rate of fare, the number of cars and the character of street-car accommodation; and suppose that the question of high or low fares was made a direct issue in the election of candidates for city offices. Here would be an issue not political, not necessarily or primarily involving a question of principle, but one which would appeal directly to the pockets of every man, woman and child in the city. Can any one doubt the result of such an election, or the effectiveness of such a remedy to cure the natural monopoly evil so-called? It would be necessary rather to put a curb on the power of the populace, which might easily be done by giving to the aggrieved monopolist the right to apply to the courts for redress, but placing the burden upon him of showing affirmatively by his books, open to the inspection of all, that real injustice has been done. It would be virtually the same procedure as now obtains when the assessors assume to crowd an undue burden of taxation upon a corporation doing business within the city limits.

Rigid " " .....	13 ft. 9 in.
Driving " " .....	6 ft. 9 in.
Weight total.....	140,700 lbs.
" on drivers.....	71,600 "
" trailing wheels .....	28,100 "
" truck.....	40,000 "
Boiler diameter.....	60 in.
No. of tubes.....	264
Diameter of tubes.....	2 in.
Length of tubes.....	15 ft.
Firebox length.....	103½ in.
" width.....	42½ in.
" depth.....	71½ in. front. 60 in. back.
Heating surface firebox.....	171 sq. ft.
" tubes.....	2,073.5 sq. ft.
" total.....	2,244.5 sq. ft.
Truck wheels diameter.....	36 in.
Truck journals.....	5½ x 10 in.
Trailing wheels diameter.....	54 in.
" journals.....	7 x 12 in.
Tender tank capacity.....	4,500 gallons
" wheels diameter.....	33 in.
" journals.....	4½ x 8 in.

One of these engines (No. 839) hauled a heavy 14-car train from Chicago to Milwaukee, 85 miles, in 115 minutes, including two stops and a delay of five minutes. Between Lake and Western Union Junction a speed of 80 miles an hour was maintained for a considerable distance. The train weighed about 500 tons.

#### The Simplon Tunnel.

The Italian government has brought forward the proposed law for the participation of that government in building the Simplon Tunnel. The government says that the project is presented under the most favorable conditions—low altitude of the tunnel, abundant water power at both ends, which lends itself to rapid work in the tunnel, to sufficient ventilation and to the eventual application of electric traction for the trains. The new road will open for commerce, passing through Genoa, a great zone now drained by Marseilles. It will shorten

notably the journey between a great part of Italy and French Switzerland; also between England and Italy. It is believed that Italy will find an immediate and special advantage in the execution of this great work in that it will open up employment for several years for thousands of Italian workmen who would otherwise be obliged to go abroad to find employment. The construction of the Simplon Tunnel will necessitate building a few short lines of connection, which will put Turin, Milan, and in fact all of Piedmont in communication with Switzerland through the tunnel.

The following are the principal clauses of the agreement between the Italian government and the Jura-Simplon Company for building and working the line. The company receiving the concession undertakes to build and work the line, and the Italian government undertakes to build the connecting line from Domodossola to the tunnel. The concession is to last 99 years. The Italian government gives to the company an annual subvention of 3,000 francs per kilometer, calculated on a virtual length of 23 kilometers; that is to say, 66,000 francs a year. The government concedes also the use of all necessary water power for every purpose connecting with building, ventilating and working the tunnel. All instruments, machines, and, generally, all the material employed in building the tunnel, will be exempt from duties. The Italian government reserves the right to buy the line at the end of 30 years paying the cost of construction, less the amount of subvention received from various sources. At the end of the concession the Italian government will reimburse the company for the expenses of construction, less subventions, and take over the line, or will renew the concession for another 99 years. In case of a renewal of the concession no further annual subvention will be paid.

According to the terms of concession, work should be

begun within 12 months from the ratification of the treaty of Nov. 25, 1895, between Switzerland and Italy, and the line should be given over to service within eight years from that date. For very complete information with regard to this work the reader is referred to the *Railroad Gazette* of Dec. 28, 1894.

#### The Improvement of the Delaware and Schuylkill Rivers.

BY WALTER ATLEE, C. E.

The Delaware River is the largest tidal river in the world upon which a comprehensive improvement of the natural channel has ever been attempted. The magnitude of the problem is so much greater and the conditions so different that the precedents established in other tidal rivers do not apply except approximately upon the Delaware.

Notwithstanding the magnitude and the difficulty of the problem, the extent of the improvement of the natural channel of the river, which has been accomplished during the last 10 years, is greater than that obtained during an equal interval of time upon any river at all approximating the Delaware. While there yet remains much to be done in the improvement of the main ship channel between Philadelphia and the sea, that which has been accomplished is an admirable tribute to the means which have been employed and the skill which has directed these means, to a continuance of this skill and the methods of the past must we look for the final successful improvement of the Delaware River.

The improvement of the Delaware River as a whole has been divided into three sections as follows:

- (1) From Trenton to Fisher's Point, a distance of 29 miles.
- (2) From Fisher's Point to Kaighn's Point, a distance of 6 miles.
- (3) From Kaighn's Point to deep water in the bay.

Upon this first section, viz., between Trenton and Fisher's Point (see plan) there has been no comprehensive project or estimate submitted beyond that required to obtain a channel 13 feet deep over Kinkora bar. Kinkora bar now carries a depth of about 8 feet at mean low water; the area between the mouth of the canal at Bordentown and White Hill carries a depth of about 6 ft., and the channel between Bordentown and Trenton has about the same depth at mean low water. The physical character of this division of the Delaware is such as to render its rectification difficult and very expensive. Its commerce has never been such as to press upon the attention of the Government the need for its extended improvement.

The second section of the river, that between Fisher's and Kaighn's points, covers the improvement of the Philadelphia harbor.

The original project for this improvement was recommended by a Board of United States Engineers on March 30, 1888, and adopted by Congress in the River and Harbor act of September 19, 1890. It proposes the formation by dredging of a channel about 2,000 ft. wide extending along the Philadelphia shore from opposite Kaighn's Point and opposite Fisher's Point, at a distance far enough removed from the present wharf line, not exceeding anywhere above 300 ft., to permit the extension of the wharves and the widening of Delaware avenue at their shore ends. It involves the removal of Smith and Windmill Islands, adjacent shoals and a part of Petty Island, so as to give a depth of 26 ft. at mean low water in a channel about 1,000 ft. wide along the revised Philadelphia wharf line, this channel decreasing to a depth of about 12 ft. along the New Jersey front; the building out of the Philadelphia and Camden shores so as to preserve a cross-section of about 55,000 sq. ft. at mean tide.

This project was modified by Congress in acts of March 3, 1891, and July 13, 1892, so as to provide for the deposit and spreading of dredged material on League Island and elsewhere. The quantity of material to be removed was about 18,000,000 cu. yds., place measurements; the cost of the dredging required to carry out this project was estimated at \$3,500,000. This scheme further provides for the simultaneous regulation of the Port Warders' lines of

the close of the following year it was annulled for failure "to prosecute the work faithfully and diligently."

Work was begun under a contract June 1, 1893, by the American Dredging Company of Philadelphia, and has been kept up continuously ever since by them.

This contract provides for the complete execution of the work, and to be paid for as appropriations may be made from time to time by law, and for continuance of the work as rapidly as may be required to the extent of dredging 400,000 cu. yds. in any one calendar month, provided funds are available for payment therefor.

The work required the removal of all trees, structures, pile and timber wharfing and revetment from the islands. Their surface averaged about 9 ft. above mean low water and about 3 ft. above mean high water. The area of the islands to be removed was about 150 acres. A portion of the Windmill Island was revetted with crib work backed with stones. All timber had also to be removed from the dikes which formed the cross channel (see plan) also the removal by dredging and scouring of about 21,500,000 cu. yds. of material.

In this work the American Dredging Company employed from 10 to 14 dipper and grapple dredges, manned by from 300 to 400 men, in excavating the material, which was placed in from 75 to 90 scows, each with a capacity of from 250 to 600 yds.

Three hydraulic dredges were employed to pump and spread the material from these scows that was placed on League Island and elsewhere. From 18 to 25 steam tugs were employed in towing the scows from which the material was dumped. These tugs hauled from 4 to 14 scows at each tow, moving with the tides, their average round trip being from 20 to 50 miles.

The consumption of coal per month varied from 2,000 to 2,500 tons. There were also about 100 men employed in the repair and construction shops. The material removed varied from clean sand and soft clay to hard clay and gravel.

There has been, so far, removed in all 24,848 lin. ft. of timber and revetment from Smith and Petty islands and the shores and interior basin of Windmill Island; and the removal from the three islands and adjacent

ing from the New Jersey shore at Fisher's Point to within 2,000 ft. of the head of Petty Island.

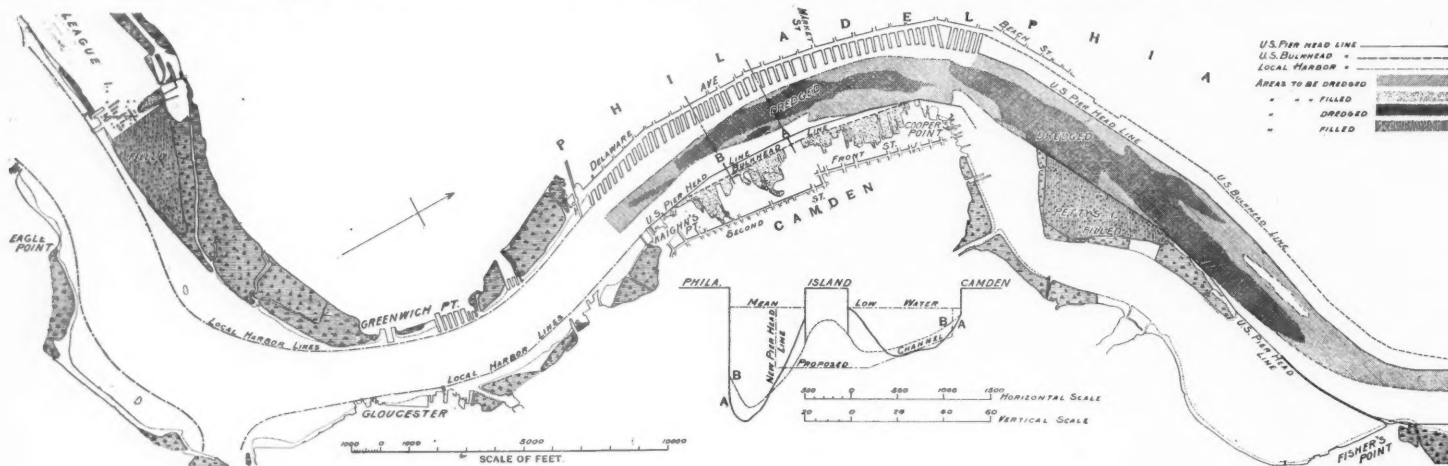
On June 30, 1890, this dike had reached an extension of 4,500 lin. ft., which is its present length, of which the upper 3,500 ft. consisted of random stone dike founded upon a brush mattress sill and backed with gravel and boulders derived from the excavation of the channel at Port Richmond, and the lower 1,000 lin. ft. of pile dike filled with stone. The tops of these constructions were carried to a height of 2 ft. above mean high water. At the close of June 30, 1894, the action of the dike had formed a channel 13 to 15 ft. deep and 270 ft. wide across the bar. Before the formation of the dike there was a depth of less than 15 ft. at mean low water over a length of 1,200 ft. and a minimum depth of 3 ft. There is now a least depth 15 ft. over the whole length. The ledge opposite Otis street has been entirely removed to a depth of 26 ft. at mean low tide.

The increased depths which have been obtained by dredging have in all cases been permanent, even over the sites of Smith and Windmill islands; where temporary deposits might have been apprehended there is no indication of shoaling.

These deductions are derived from repeated surveys of the deepened areas and from an experience covering active dredging operations extending over an interval of three years.

The data required for the execution of the work, and the determination of its effects and changes during its progress, have been obtained from daily detailed hydrographic examination and surveys, based on a rigid system of triangles and range lines marked by natural objects, covering the entire distance from Fisher's and Kaighn's Points, 6½ miles. Tidal observations are registered by an automatic gage.

During the past month of December about 442,500 cu. yds. of material were excavated and deposited by 10 grapple and scoop dredges, and one hydraulic dredge with an estimated average capacity of of 1,500 cu. yds. each, and two hydraulic dredges for placing material on League Island. Dredging operations, except pumping on Petty Island, were suspended for the winter season on December 31st.



Sketch of Philadelphia Harbor.

both the Pennsylvania and New Jersey shores of the river, so as to maintain the assigned cross-section of the new channel and the establishment of these lines by actual constructions during the progress of the work. The reconstruction of the water fronts to conform to the new lines will be executed at the expense of the cities of Philadelphia and Camden or the riparian owners. The cost of this reconstruction for that portion of the Philadelphia front from opposite Kaighn's Point and opposite the lower end of City Island, exclusive of the cost of property for widening Delaware avenue, has been estimated at \$8,000,000.

This work will be made the subject of a separate paper.

In the River and Harbor act of September 19, 1890, the Secretary of War was authorized by Congress to enter into a continuous contract for the completion of this improvement under such appropriations as Congress might make from time to time. Since 1890 provision has been made for carrying on this improvement by yearly appropriations contained in the Sundry Civil bill.

This improvement was initiated in 1890 by an appropriation of \$300,000 by the General Government, of \$200,000 by the State of Pennsylvania, and \$218,652.86 by the city of Philadelphia for the purchase of the islands to be removed and the property thereon.

The total amount appropriated by the General Government up to this time for this work is \$2,340,000, leaving \$1,160,000 yet to be appropriated for its entire completion.

Six hundred thousand dollars was appropriated by the last Congress for the continuation of this improvement during the current year.

At the close of 1895 all available funds were practically exhausted.

Previous to the removal of the three islands between Philadelphia and Camden, they caused the flood and ebb tides to pursue different paths, and thus narrowed the channels which were forced so near the shores as to prevent the wharves necessary for the purpose of commerce.

In April, 1891, a contract was entered into, but before

shoals of about 15,000,000 cu. yds. by dredging, 3,000,000 cu. yds. of which were deposited upon League Island, and the remaining 12,000,000 cu. yds. were hauled away and dumped.

It is expected that during the next six months at least 2,700,000 cu. yds. of material will be excavated and deposited and that the filling on League Island will be completed.

The data for this account has been obtained through the courtesy of Major C. W. Raymond, of the United States Engineers, the officer under whom this vast improvement is being done, and to that of his assistants, and also to L. Y. Schermerhorn, Esq., formerly United States Assistant Engineer, and now President of the American Dredging Company, the writer is indebted for much valuable assistance; indeed, if it had not been for their willing co-operation, it would have been impossible to prepare this article.

The work already done upon the improvement of Philadelphia harbor has resulted in obtaining a channel 26 ft. deep from Davis to Huntingdon street, a distance of 15,400 ft., or about 2.3 miles. Its minimum width in this distance is 400 ft., its maximum width 1,000 ft. and its mean width 780 ft., measured from the newly-established pier-head line. Above Huntingdon street, dredged to the same depth extends from Pier 3 north to Erie avenue, 7,000 ft., the mean width of channel being 490 ft. Smith and Windmill islands have been removed to an average depth of 23 ft. below low water. The northern side of Petty Island has been dredged back so as to give an average low water width of 1,887 ft. to the Pennsylvania channel at that locality. All the pile and stone revetment and timber work have been removed and the filling of spaces on League Island, as provided for in the contract, has nearly been completed. About 133 acres of land, formerly above low water, have been removed and 282 acres, of which 135½ acres were on League Island and 146½ acres on Petty Island, formerly below, has now been raised above high water.

At Five Mile Bar, which lies directly above the upper end of Petty Island, a dike has been constructed, extend-

The improvement of the third section of the Delaware River, viz., between Philadelphia and the sea, was undertaken in accordance with a project and estimate submitted by a board of United States engineers on Jan. 23, 1885. This project proposes the formation of a channel 600 ft. wide and 26 ft. deep at mean low water at all points where less width or depth occurs. There were six locations where such improvement was necessary, as follows: Mifflin Bar, Schooner Ledge, Cherry Island Flats, Bulkhead Bar, Dan Baker Bar and Duck Creek Flats. See plan.

Except at Schooner Ledge, where the desired channel was to be obtained by dredging and the removal of rock, and at Cherry Island Flats where dredging only was necessary, the plan proposed for obtaining the desired depth and width at the locations was the construction of dykes by which the tidal currents would be directed and concentrated upon the shoal areas, and the channel deepened and maintained.

The estimated cost of this project in 1885 was \$2,425,000, with an annual expenditure for repairs and preservation after completion of \$87,000. Previous to 1835 about \$1,500,000 had been appropriated and applied by the government toward improving to a depth of 20 to 24 ft. the various shoal areas in the Delaware River between Philadelphia and the sea. Since the date of the existing project in 1885, \$1,120,000 have been appropriated, of which about \$160,000 remain on hand.

Mifflin Bar is about 10 miles below Philadelphia. The existing works for its improvement consist of a random stone dike, and extending from the Pennsylvania shore at Hog Island and the head of Maiden Island a distance of 7,200 ft. Before the building of the dike there was a depth of less than 26 ft. at mean low tide over a length of 4,500 ft. and a minimum depth of 17 ft. There is now a least depth of about 25.6 ft. at mean low tide over the bar.

Schooner ledge is at a point about 10 miles below Philadelphia. The main ship channel was originally obstructed by a ledge of rock which reduced the depth at mean low water to about 18 ft.

In 1879 the formation of a channel by dredging was commenced through this obstruction and continued until 1884, when a channel was reported as formed to a depth of 24 ft. for a width of 330 ft. Afterward other obstructions were discovered and in 1889 250 cu. yds. of sand and rock were removed.

Before improvement there were here, including the bar between the ledge and Marcus Hook, a depth less than 26 ft. at mean low tide over a length of 8,600 ft. and a minimum depth of 18 ft. There is now a depth of less than 26 ft. over a length of 7,850 ft. and the minimum depth is 21 ft. The Government has done no work at this locality since 1885, but the recent appropriation of \$185,000 by the city of Philadelphia will permit the removal of the rocky ledge obstructing a part of the channel and the dredging necessary to remove all obstructions from this section of the river to a depth of 26 ft. at mean low water in a channel 600 ft. in width.

This work is now being done by the Philadelphia Public Works Construction Company under contract dated November, 1895, and will probably be finished by the close of the current year. Twenty-seven miles and a half below Philadelphia is Cherry Island Flats. Here about \$100,000 was expended in 1892-3 in deepening and widening the channel by dredging in accordance with the adopted project. The results were less favorable than hoped for, and since the deepened channel was formed in 1893 the lower 4,000 ft. has again shoaled to about 20 ft. at mean low water. The entire length of the deepened channel was about 10,000 ft. The physical characteristics of the river at this locality are such as to preclude its improvement by means of dikes, and in dredging must be sought the means of obtaining and maintaining a deepened channel.

The Board of 1885, after a careful study of this locality and in view of the then past permanency of the dredged channel, recommended this method and improvement upon the lines of the channel as previously adopted. Later and more detailed study of the locality indicates that the coincident paths of the flood and ebb tide are found somewhat to the eastward of the present location of a part of the channel and by the shifting of the channel, so as to bring it within the influence of the common path of both the flood and ebb tide, its permanency after dredging can be very reasonably assured. Should such expectations be realized, the formation of a deepened channel at Cherry Island Flats can be quite quickly obtained by a comparatively small expenditure.

Bulkhead Bar is situated about 36 miles below Philadelphia, or three miles above Ft. Delaware.

Formerly this bar carried 20 to 21 ft. of water at mean low tide. A dike was begun on Aug. 25, 1890, and completed on June 30, 1892, on the east side, this dike being 4,063 ft. long; this is a pile dike filled with stones. Fifty-one thousand eight hundred and ten cubic yards of material were dredged from the channel.

There is now a depth of 26 ft. and 600 ft. in width at mean low water over the whole length (7,300 ft.). The action of this dike, which has been in operation about three years, has been so extraordinarily favorable that very reasonable anticipations of its ultimate success may be indulged and the permanent improvement of the bar accepted as almost demonstrated. Should this expectation not be entirely realized it could undoubtedly be secured by comparatively small addition to the existing work of improvement.

The next locality below Bulkhead Bar requiring improvement is Dan Baker Shoal, 48 miles below Philadelphia. Here the river suddenly expands to a width of nearly four miles and there exists an area in the main ship channel of several miles in length with a depth of water of 20 to 24 ft. The Board of Engineers of 1885 proposed for the improvement of this locality a dike about five miles in length for the purpose of forcing the flood tide from the deep concavity on the west bank of the river below Reedy Island and conjointly with the ebb-tide secure a scouring action of the tidal currents along the main ship channel over the shoal areas forming the present bar.

This dike was to have been a low-water dike and its average estimated cost was \$324,000.

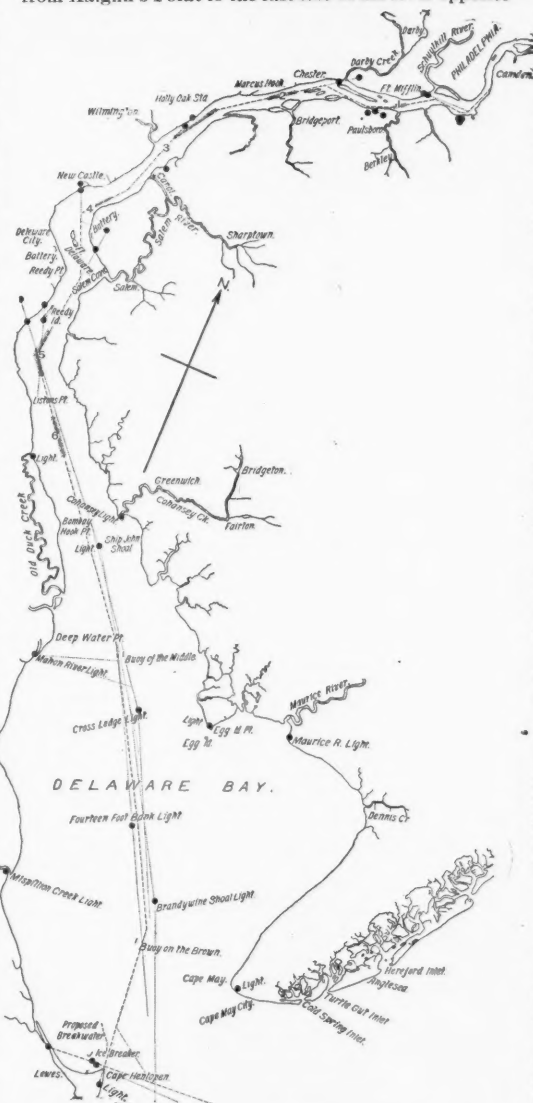
At present the dike is being extended under a recently executed contract. From the experience which has already been gained in the action of low-water dikes it is highly probable that a low-water dike would not accomplish at this locality all that might be desired and that experience would ultimately require that the dike be raised to above high water; such a construction would probably increase the previous estimate, to say, \$500,000. After the study which has been given to this locality it is extremely probable that no better plan for the improvement of the Dan Baker Shoal can be suggested than a dike on the lines proposed by the Board of 1885, modified, however, by raising the dike to a height in excess of that proposed by the Board. It is also probable that the action of the dike should be supplemented by dredging a channel through such parts of the shore areas as did not yield readily to the scouring action of the tidal currents. If such dredging became necessary the estimate for the improvement of this locality would be increased to above \$600,000.

At Duck Creek Flats, which is the next and last locality requiring improvement, the 26-ft. curves of depth are separated by a distance of about five miles. For the improvement of this shoal the Board of 1885 recommended a low-water dike along the west side of the channel about seven miles in length, at an estimated cost of \$420,000. The dredging of a channel 600 ft. wide and 26 ft. deep would probably cost from \$200,000 to \$300,000,

and without regulating works the value of such a dredged channel would be of but short duration.

At Duck Creek Flats the physical characteristics of the river cease, and those of the estuary begin. Under such conditions the improvement of the locality requires consideration differing from that which might be applied to localities further up the river. While high-water dikes of determinate length are required for the improvement of the river section, it is probable that dikes of less height and on different lines would be required in the estuary section of the river. Under the light of recent experience it is impossible to revise the recommendations of the Board of 1885 for this locality. But in a general way their estimate of \$420,000 may be accepted as a reasonable approximation of the work. The improvement of the river channel should generally progress from the upper to the lower part of the river, and as the work to be done above Duck Creek Flats will absorb all available funds for some years to come, there will be in the meantime ample opportunity to further study this locality, and under the light of larger information devise detailed plans for its improvement.

The improvement of the Delaware River in the vicinity of Greenwich Point has never formed a part of the specific plan for either the improvement of the river or harbor, probably for the reason that the harbor improvement, when completed, would permit a passage of the main ship channel for the west side of the river opposite from Kaighn's Point to the east side of the river opposite



Sketch Map of the Approach to Philadelphia Harbor, Showing the Lights.

Greenwich Point. It would be to the advantage of the commercial interest at Greenwich Point if the 1,000-ft. deep-water channel on the Philadelphia side of the river, above Kaighn's Point, could be carried continuously along the same side, below Greenwich Point. To accomplish this would require the removal of about 500,000 cu. yds. of material at an estimated cost of \$200,000.

In brief summation of the Delaware River below Philadelphia, it may be said that at the end of the current year the city will have secured a channel 26 ft. deep over Schooner Ledge, and that at this time, with the exception of the shoal water over part of Cherry Island Flats, a channel of navigable width and 26 ft. deep will exist from below Greenwich Point to Dan Baker Shoal, leaving that locality and Duck Creek Flat the only obstruction to a deep-water channel to the sea.

It seems probable that these two localities could be improved by the expenditure of \$1,300,000, or the amount yet remaining to be appropriated under the estimate of the Board of 1885.

The Schuylkill River between its mouth, opposite League Island, the southern extremity of Philadelphia city and the Fairmount dam, is about  $8\frac{1}{4}$  miles in length.

Of this distance about one mile is above the Chestnut street bridge, which is unprovided with a draw, and therefore limited to barges and coal boats. The river between its mouth and Chestnut street is crossed by five draw bridges of ample capacity for vessels using this part of the river.

The commercial interests at present tributary to the Schuylkill below Chestnut street bridge divides the river into two sections, viz., between the mouth and Gibson's Point, a distance of  $4\frac{1}{2}$  miles; and between Gibson's Point and Chestnut street bridge, about 3 miles.

The commercial requirements of the lower section are those pertaining to the grain and oil trade, which demands vessels of heavy draft, while the commerce of the upper section is limited to a trade requiring vessels of materially less draft.

The improvement of the Schuylkill River was commenced by the government in 1870, under a project that proposed the formation by dredging of a channel 100 ft. wide and 20 ft. in depth at low water between the mouth and Gibson's Point. In 1895 the project was extended so as to increase the channel between the mouth and Girard Point to a width of 400 ft. and a depth of 24 ft. In 1883, after the expenditure of \$325,000 upon these projects, they were further expanded so as to widen to 250 ft. the previously formed channel 130 ft. wide and 20 ft. deep between Girard and Gibson's Points. The plan having failed to form, by dredging alone, the 24-ft. channel below Girard Point, it was decided in 1892 to attempt the improvement of the bar obstructing the entrance to the river by means of dikes adjacent to the shoal areas.

The dredging of the channel was begun in 1870; up to June 30, 1892, about 1,416,000 cu. yds. of material had been removed, of which 550,000 cu. yds. were dredged between the mouth of the river and Girard Point, a distance of about a mile.

A dangerous obstruction of about 400 cu. yds. of material was also removed from the channel above Penrose Ferry bridge.

During the fiscal year ending June 30, 1893, two earthen dikes of a total length of 2,797 ft., and a pile dike 800 ft. long, were constructed for the improvement of the channel at the mouth by the concentration of the flow of the water over the bar and to prevent the soft material of the lower portion of the south shore from sliding into the channels. Since that date the earthen dikes have been completed for a distance of 4,497 ft. Unless further extension of the pile dike is found necessary, the project has been completed, and thereby navigation has been greatly improved. The necessity for further extension of this dike cannot be determined until the channel has been examined after the spring freshets.

The amount appropriated for the improvement of the Schuylkill River by the government, from its inception in 1870 to the present time, is \$505,000. The city councils of Philadelphia appropriated last year \$40,000 for the improvement of the river below Fifty-second street.

At the time of the adoption of this project the natural channel of the river over the bar at its mouth had a mean low-water depth of about 16 ft.

The work already done has resulted in the formation of a channel about 150 ft. wide and 21.3 ft. deep at mean low water across the bar at the river's mouth, a channel 250 ft. wide and from 20 to 24 ft. deep from inside the bar to Gibson's Point, except at Yankee Point, where the width is 300 ft. and between Penrose Ferry bridge and Yankee Point, where the 20-ft. channel has narrowed to from 50 to 200 ft.

#### Counterweighted Arch Bridge at Riesa.

The road bridge over the river Elbe at Riesa, Saxony, has some peculiarity of design and construction. It is carried by the same piers as the double-track Leipzig-Dresden railroad bridge, and has three spans each of 100 m. (= 328 ft.), and one of 44 m. (= 144.5 ft.). The girders are parabolic latticed trusses; but to take from the chords the stresses of the dead load, they are given an invariable thrust by a loaded angle-lever in the abutment on the left bank, as shown in Fig. 1. This enables the arch to withstand most favorably the bending movements of the live load. The horizontal thrust caused by this lever is about 600 tons.\* Its long arm being 5.3 m. (= 17.4 ft.), and its short arm 2.75 m. (= 9 ft.), the load required to effect this thrust is  $600 \times 2.75 \div 5.3 = 311$  tons; and it is composed chiefly of slag.

By thus making the resistance at the abutment constant, there is no necessity for limiting the height of the arch for the purpose of lessening the stresses which temperature variations cause in common arches; hence these have a height of 15 m. (= 49.2 ft.).

The oblique position of the thrust-bars calls for a pair of oscillating anchors to hold them down. These are fastened below the masonry of the abutment, and are shown in Fig. 1.

The abutment on the right bank of the Elbe (see Fig. 2) has a triangular trestle, the hypotenuse of which represents the thrust-bar. As the points of application of the thrust on the abutments are considerably below the roadway, the moment of the thrust, when first applied, has caused a rotation of from 20 to 30 sec. of arc.

Another peculiarity of this, as well as of the railroad bridge, which rests on the same piers, as before stated, is that the cross-beams are pierced for the passage of the

\*[All tons here mentioned are metric, of 2,205 lbs. av.]

string-pieces, which have the full length of the spans—100 and 44 meters respectively.

The string-pieces are connected with the cross-beams by four angle irons; and a pair of cross-beams at each end is braced horizontally by plate-iron, so that the string-pieces are framed into the chord of the girder. The string-pieces receive from the main moving load 337 kg. per sq. cm. (=4,800 lbs. per sq. in.) stress; and as the bending influence of the entire load is 741 kg. per sq.

during rising temperature, was accompanied by a sudden extension of 10 mm=0.4 in.

The extremes of temperature of the structure have been 25.9 deg. and -10.82 deg. C. (say 78.80 deg. and 12 deg. F.); and those of the air 37.50 deg. and -18.1 deg. C. (=99 deg. and -0.4 deg. F.), giving variations of 36.72 deg. and 55.6 deg. C. (=66.1 deg. and 100.1 deg. F.), respectively.

The total movement of the end of the bridge being 156 mm., and the counterweight-lever having arms  $\frac{2}{3}$  to

dustry of most of the countries of Europe and also of the United States. The present report, which is a compact and orderly massing of facts and difficult of condensation, is in two parts, describing first the coal districts of the Donetz Basin and secondly the iron and steel industry of Southern Russia.

The ore deposits are situated north of the Crimea Peninsula and to the northeast of the Sea of Azov, mostly in the district between the Don and Dnieper rivers, although there are many important ore deposits east of the latter river. The largest deposit of ore is east of the river and has been known since 1731. The Russian Government made repeated efforts to encourage the making of pig iron here, but little progress was made until the building of the Catherine Railroad some years ago, which connected the Donetz coal district and the ore deposits at Krivoi-Rog. The famous Cockerill Company, of Belgium, became interested in the district about 1836, and since then many important companies in France, Belgium and Germany have built works in Southern Russia, and American and English capital has also been invested in the district. Besides the Krivoi-Rog deposit other properties in the district are the Galkorska, the Schmakoff and the Rostkorska, owned by the Dnieproviennye Company, and, further to the south, that of the Novorossisk Company, better known as the Hughes concern. The district has produced, to date, 4,500,000 tons of ore, of which the Krivoi-Rog has mined 1,260,000 tons, the Hughes a little over 1,000,000 tons, and the Dnieproviennye about 1,000,000 tons. M. Trasenster estimates that there is still available high-grade ore to the extent of over 10,000,000 tons, with a large reserve of lower-grade (50 per cent.) ore.

The high-grade ore runs from 60 to 70 per cent., with an average of about 66 per cent. Many of the deposits are worked by open cut, after stripping from 15 ft. to 30 ft. of earth. The cost of mining depends chiefly on the amount of stripping necessary. M. Trasenster estimates that the ore costs 75 cents to \$1 a ton, on cars, including a royalty of 14 to 28 cents per ton. The freight rates are low and ore is shipped 900 miles to Polish works. The iron and steel works of the district are in most cases controlled by the companies owning and managing the mining interests, and are situated at or near the mines which supply them. The coal from the Donetz basin of Ekaterinoslar, in the immediate vicinity, has been an important factor in the development of the manufacturing interests there.

The Krivoi-Rog Company has two furnaces in blast, and 80 Coppe coke ovens, the coal for which is supplied

from its own colliery, 343 miles distant. The company has paid five per cent. dividends for seven years, calling for 250,000 francs a year. Its ore production in 1895 was 125,000 tons, and 228,000 tons in 1894. Its make of pig iron was 21,000 tons last year and 23,000 tons the year before. The Dnieproviennye Company controls the Kamenskoe works on the Dnieper, and paid 30 per cent. dividends in 1895 and 20 per cent. in 1894. The plant includes five furnaces, two 8-ton Bessemer converters, four 20-ton open-hearth furnaces, three basic and one acid, and a puddle mill. The rolling mill includes a heavy reversing blooming mill, a three-high rail train, a heavy beam train, three merchant trains, a plate mill and two sheet mills. Another large plant is situated at Alexandrofsk, and is owned by the Briansk Company, which also builds engines, locomotives, cars, etc., in its Bejitz works, in the Oural department, Central Russia. The company has four furnaces in blast, and a Bessemer and open-hearth department, a rolling mill and puddle mill. This company also paid 30 per cent. dividends in 1895 and 22½ per cent. in 1894. At the Hughes works, on the banks of the Calmions, are six blast furnaces and nine 20-ton acid open-hearth

furnaces. The mills contain a 3-high blooming mill and a 3-high roll train, 3 merchant trains, a bolt and nut shop and a foundry. The greater part of the ore comes from the company's mines at Krivoi-Rog, 297 miles, although some local ore is used. This company's output of rails in 1895 was 65,000 metric tons; in 1894, 56,700 tons, and in 1893, 51,600 tons. Its make of pig iron last year was 171,000 metric tons; in 1894, 150,000 tons and in 1893, 135,000 tons. The dividends in 1893 and 1894 were 25 per cent., on a capital of £300,000. Another important plant is the Donetz Steel Works, started in 1891, at Droujkofka. In 1895 this works produced 25,000 tons of ingots and 20,000 tons of rails. Be-

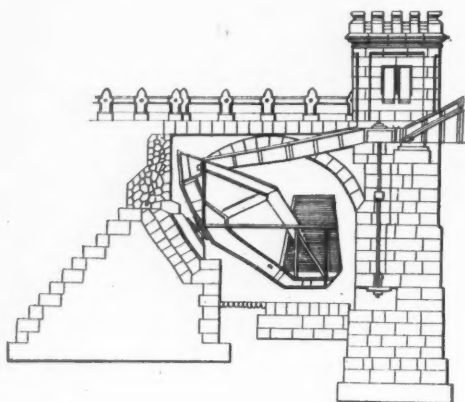


Fig. 1.—Left Bank.

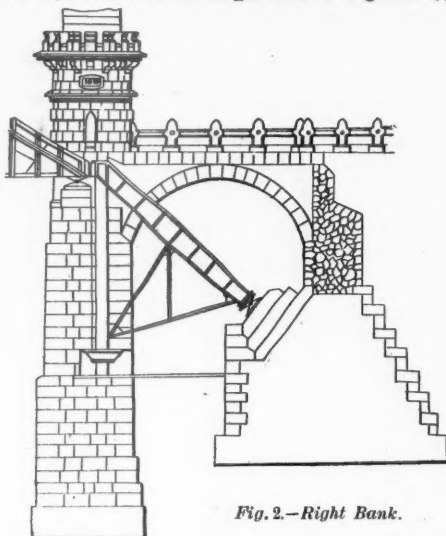


Fig. 2.—Right Bank.

The Riesa Counterweighted Arch Bridge.

cm. (=10,600 lbs. per sq. in.), the maximum stresses are 1,078 kg. per sq. cm. (=15,400 lbs. per sq. in.). The greater portion of this stress is caused by the dead load of the other road-covering resting on a solid floor of iron. This arrangement of the string-pieces has avoided the loosening of the rivets, common where the string-pieces extend only from one cross-beam to the next.

The economy in material in the chord effected by the use of loaded thrust-levers may be calculated as follows:

	Tons.
The dead load of the floor of a 100-m. span is 176.64 cu. m. of broken stone.....	324.17
381 iron plates.....	45.69
Angle-bars framing the road-material.....	2.94
Rivets and small square bars.....	0.96
Railing.....	3.88

Total dead load..... 377.53 T  
This gives a dead load per meter run of..... 3.775 T  
To which add weight of structure..... 5.625

Total load per meter run..... 7.400 T  
The lengthwise thrust is consequently  
 $\frac{0.125 \times 7.4 \times 100^2}{15} = 616.66 \text{ T.}$

The thrust caused by a crowd, say 360 kg. per square meter = 73.73 lbs. per sq. ft. for a breadth of 7.6 m = 24.94 ft. is

$$\frac{0.125 \times 0.36 \times 7.6 \times 100^2}{15} = 228.00 \text{ T.}$$

To which add..... 616.66 T  
Giving a maximum pressure in center of arches of.... 844.66  
whereas the chords would get only 228 tons, if the thrust of the lever was 616.66 tons. As a matter of fact, the lever thrusts with only 600 tons; so there is a slight tension in the chords.

The gross area of an arch to sustain half of the total pressure would be..... 533 sq. cm.  
and that of the chord to stand 114,000 kg. pull... 184.2

Showing a saving of..... 348.2 sq. cm.  
or for a pair of girders, 696.4 sq. centimeters or 116.25 sq. in.

This would amount to 540 kg. per meter run, or 362 lbs. per foot run; and the required weight of a common girder with stronger arcs would be 98.3 tons more; giving for the three large spans 294.9 tons gross saving. From this is to be deducted the weight of the levers, 117.8 tons; leaving a net saving in weight of 177.1 tons.

The following table shows the saving of material in counterweighted arches, over common parabolic trusses, for one railroad track:

Span.	m.	ft.	Common Girder.		Riesa Girder.	
			Kg. per m.	Lbs. per ft.	Kg. per m.	Lbs. per ft.
50	164		1,970	1,224	1,858	1,249
100	328		2,883	1,937	2,546	1,711
150	492		4,006	2,692	3,254	2,187
200	656		5,471	3,677	4,060	2,728
250	820		7,506	5,084	5,406	3,304
300	984		10,798	7,256	8,986	4,331
350	1,148		16,939	11,383	12,62	4,889
400	1,312		22,031	15,255	18,921	5,985

This table is calculated on the assumption that the height of the trusses is one-eighth the span, and that the permissible stress is 800 to 1,000 kg. per sq. cm. = 11,490 to 14,300 lbs. per sq. in.

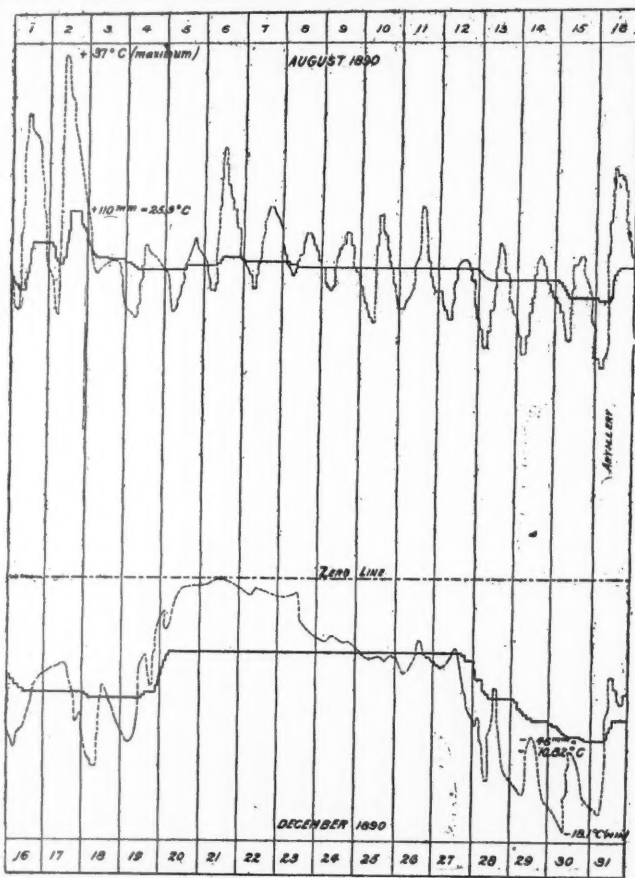
To measure and record the changes of length of the Riesa bridge there is a clock with a metal thermometer on the left abutment. The full line on the annexed diagram shows the changes of the 244.2 m. length of the bridge; the dotted lines, temperature in degrees Centigrade—each degree, corresponding nearly to 2.125 mm. of height of diagram, showing an equal amount of change in bridge-length.

A retardation of the expansion due to increase of temperature is caused by resistance of the rollers, by sliding friction on the plates, and by the mass of the roadway. A sudden shock causes sudden elongation; thus the passage of a body of artillery in the morning,

1, the loaded end of the lever has a movement of 39 cm. = 15.375 in.

[Concerning this bridge we have the following characteristic comment from two of the best bridge engineers in America. We do not print their names, but at least one of them will be recognized by his freedom of speech.]

"I have not great confidence in devices for compensation such as are described, yet I think it may be worth while to publish the paper. It will at least give those who have more time for study an opportunity to find out about it. I should question, from a hurried examination of the description, whether it will at all times re-



Variations of Length of Riesa Bridge Due to Changes of Temperature.

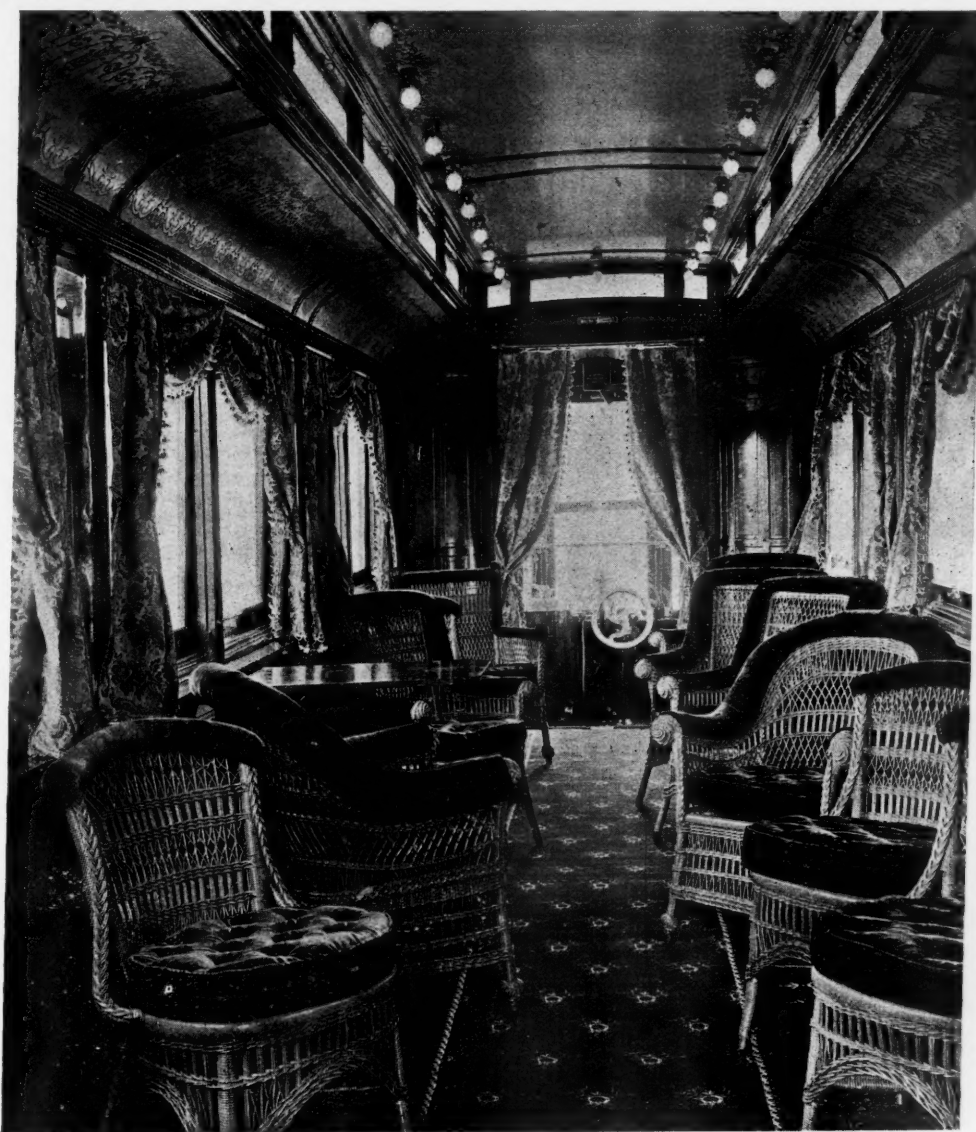
NOTE.—The full line shows variation of length (half-size); the dotted line shows changes of temperature.

tain its efficiency; but I am not prepared to say that it will not do so."

"It may be interesting as a matter of record to print the description of this gimcrack, but the theoretical discussion is rot and the thing itself ridiculous."

#### Iron Production in Southern Russia.

An article in the *Iron Age* for July 16, taken from a report of M. Trasenster, of Liege, Belgium, in the *Revue Universelle des Mines*, describes at length the iron industry of Southern Russia. M. Trasenster has made similar investigations of the mineral resources and in-



Interior of Parlor Car for the Springfield Street Railroad.

sides these larger plants are several on a smaller scale, and a number of works are now being put up, notably in the Donetz coal basin at Volinzero, at Jouriefka and at Lougansk.

The rapid development of the iron industry of the district since 1886 has exceeded the highest expectations. The pig-iron product, which in that year was 36,000 tons, rose to 90,000 tons in 1888, 220,000 in 1890, 308,000 in 1893, and 465,000 in 1895. This last output was greater than that of the Urals, and brings the Southern District into the first place in the pig iron and steel production of Russia. Until recently rails were the principal product of the Southern industry, being about two-thirds of the total output, but lately there has been a large increase in the manufacture of finished iron and steel for various purposes. The slow development of the puddled-iron industry is due to the competition of the charcoal iron made in the Ural mountains.

The table given below shows, by districts, the total production of iron and steel in Russia, in 1895, in metric tons:

District.	Pig Iron.	Finished Iron.	Steel Ingots.	Finished Steel.
St. Petersburg.....		41,000	111,700	91,100
Ural Mountains.....	551,000	254,000	93,000	54,000
Moscow.....	128,000	46,300	94,600	60,000
South.....	565,000	42,000	315,000	257,000
Poland.....	190,000	65,500	153,000	107,000
Siberia.....	9,000	6,000		
Finland.....	25,000	10,000		2,000
Totals.....	1,469,000	465,000	770,000	574,100

A summary of the rail orders given to Russian mills by the government, which controls about two-thirds of the railroad mileage, is as follows: The Briansk, Hughes, Dnieprovienné and Donetz companies have orders for 100,000 tons, to be delivered in 1895, 1896 and 1897. The Russo-Belge Co., at Volinzero, has 200,000 tons to furnish from 1897 to 1902 inclusive. The Poutilef Company, at St. Petersburg has a contract for from 15,000 to 25,000 tons a year for three years. The Beloselski and Demidoff works in the Urals each have 16,400 tons a year, for three years, and the Powlorzeff works, in the same district, have 8,200 tons a year, for five years. The proposed plant at Nijni-Udinsk, Central Siberia, has a contract for 16,400 tons a year, for four years. The orders foot up about 200,000 tons for 1896, and 230,000 tons for 1897.

For many years there has been a considerable annual increase in the mileage of Russian railroads. The author estimates that the average mileage of new roads opened for traffic in Russia from 1875 to 1880 was 464 miles a year; from 1881 to 1885, 402 miles a year; and from 1886 to 1890, 572 miles a year. In 1891 only 73 miles was opened, and 345 miles in 1892, but 1,133 miles

were opened in 1893, and 1,294 miles in 1894. The railroad mileage of Russia on Dec 31, 1894, is given as 22,978 miles, of which 4,837 miles was double track. The table of the *Archiv für Eisenbahnwesen* which we published in our issue of July 10, gives the Russian railroad mileage as 22,096, not counting 890 miles in the Trans-Caspian District. The lines under construction aggregate 3,780 miles in European Russia, 530 miles in Trans-Caspian and Trans-Caucasian districts, and 2,630 in Siberia, not including the Amour line of 1,325 miles.

#### Parlor Cars for Electric Railroads.

The Wason Car Co., of Springfield, Mass., has delivered to the Springfield Street Railway Co. a parlor car or chair coach, which is in some respects a departure from other recent practice. Some of the new features may be seen in the engravings which show the exterior and interior of the car.

It is 25 ft. long and 7 ft. 10 in. wide. On each end is a vestibule 5 ft. 6 in. in length, where four or five people beside the motorman can be comfortably seated. Double doors lead from the vestibules to the interior of the car, which slide quietly backward and forward, one work-

ing the other. The decorations on the outside of the car are not elaborate, but pleasing. The interior of the car is finished in light colors, the carpet, draperies and ceiling all harmonizing and the ceiling being handsomely decorated. The inside electric lights instead of being ar-

ranged in chandelier form in the middle of the car are distributed along the entire length. The vestibules are lighted each by a four-globe chandelier. The car has 20 chairs in it. These are of white cane with olive colored plush for the seats and trimmings and they can be moved to any part of the car. At regular intervals along the side of the car there are places for tables for card playing or luncheon. When not in use these tables are stored in the vestibule of the car.

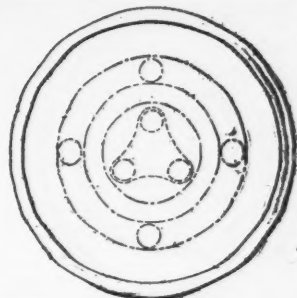
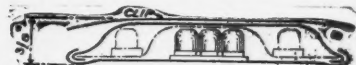
The car is equipped with air-brakes, which are worked by a lever close to the hand of the motorman and also with hand brakes to be used in emergency. The car is heated by the Consolidated Car Heating Company's equipment, which runs along the sides near the floor. There are no signal straps about the car, but electric buttons on the platforms allow the conductor to signal to the motorman.

#### Jenkins' Fog Signal.

Messrs. Thomas Jenkins & Co., of Birmingham, England, are the manufacturers of an improved torpedo, or detonator, as they call it, which has given such satisfaction on the London & North Western, where it has been used, that the rule requiring two torpedoes to be placed upon the track when it is required to stop a train has been abolished on that road, and only one torpedo is now used. From the plan and cross-section shown here-with it will be seen that the space within the outer shell of the torpedo is divided into two compartments, the lower and inner one containing three caps with a supply of powder, and the outer one four caps, also with a supply of powder. The diameter of the plan is about four-fifths of that of a full-size torpedo. On the plan the three caps in the lower chamber are shown in the center of the drawing, within an enclosure of approximately triangular shape. In the vertical cross-section the shape of the partition separating the two chambers is indicated by the broken line.

The makers claim that these torpedoes have increased resistance of rust and damp, and that the method of manufacture is such that they get rid of whatever risk there may be of putting in insufficient charges of the proper explosive compounds.

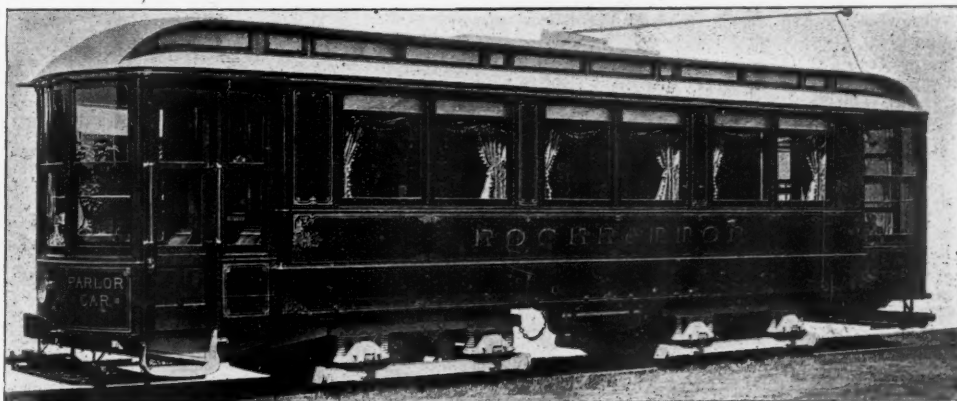
The two chambers are independent of each other



Thomas Jenkins &amp; Co.'s Patent Duplex Detonator.

and one is fully charged, and in every respect a perfect detonator before the second chamber is added—the respective operations in every case being performed by different hands.

On the English railroads in time of fog a great many torpedoes have to be used, and a man being deemed necessary at each signal or group of signals, the expense of fog signaling is quite heavy. Moreover, the addition of third and fourth main tracks, as on the important lines in the vicinity of London, increases the work of the men who attend to fog signals and greatly increases the danger to which they are exposed in crossing and recrossing tracks. This danger had several years ago been found so great that the London & North Western put on a second man in many cases. Even with the most alert attendant it will often be found impossible to take



Parlor Car for the Springfield Street Railroad.

off more than one torpedo after a signal has been pulled to all clear and before the train reaches it. To overcome this difficulty an apparatus for placing two or more signals simultaneously, either on one or several tracks, was devised and has been in use

three or four years. Since the adoption of Jenkins' torpedo these machines, arranged in each case to place two torpedoes on the same rail, have been changed so as to operate only one torpedo on each track. The manufacturers of this apparatus in their prospectus say that it has important advantages besides providing for the safety of the men. It prevents many petty delays and avoids the wholesale and useless explosion of torpedoes. Fogmen and enginemen can work with a greater feeling of security. In a period of five days in December, 1891, at the down signal at the south end of Primrose Hill tunnel, near London, fog signals had to be put on the track 273 times, so that without the machine the man would have been obliged to cross the up track 1,092 times. Formerly the fogman rarely succeeded in getting more than one torpedo off before the train was upon him, thus wasting torpedoes and conveying a false signal to the engineman.

#### The Houston Track-Sanding Apparatus.

The accompanying illustrations show the Houston Track-Sanding Apparatus as applied to locomotive sand-boxes.

Fig. 1 shows a photograph of a model for exhibition purposes, and from it a general idea of the arrangement of the parts can be obtained. A nozzle is shown in this photograph, which is similar to the one used in the sand-box.

Fig. 2 shows a plan and elevation of a locomotive sand-box, with the Houston device in place. The air-valve *A* is located at any suitable place in the cab, convenient to the engineer. A  $\frac{3}{4}$ -in. copper pipe connects this valve with the main air reservoir. From the air-valve two  $\frac{3}{8}$ -in. copper pipes lead to the nozzle *B* in the sand-box, one of which delivers sand to the front and the other to the back pair of drivers.

Fig. 3 shows the detail construction of the air valve and Fig. 4, likewise, shows the construction of the nozzle.

As will be seen from Fig. 3, the air enters the air valve above a plate, which is turned by the engineer's handle.

There are two holes in this plate and two holes in the body of the valve. When the handle is immediately in front, all holes are covered and this is the running position. When turned to the right of the running position, one hole in the plate comes opposite one in the body of the valve, which allows the air to pass through the valve and hence to the nozzle provided for sanding the front drivers. Turning the handle to the left of the running position brings the other pair of holes opposite,

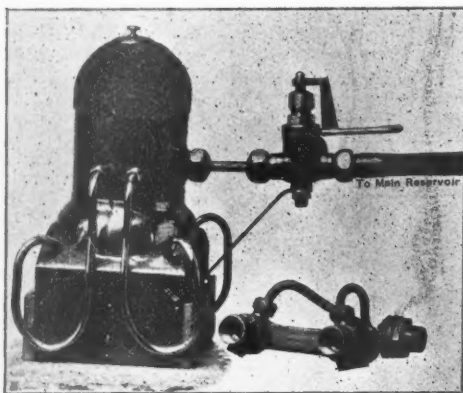


Fig. 1.

and air passes to the nozzle for sanding the back drivers. When the handle is turned through 180 deg. from the running position, both holes in the plate come opposite the holes in the body of the valve and sand is delivered to both front and back drivers. The air enters the nozzle at *C*, as will be seen from Fig. 4, while the sand comes in at *D*. The sand meeting the stream of air is driven through the delivery pipes leading to the drivers, the amount of sand delivered being regulated by the air pressure, which in turn can be reduced by throttling in the air valve.

This apparatus is covered by patents of Mr. J. A. Houston. The Western Railway Equipment Company, of St. Louis, are the sole agents, to whom we are indebted for the information contained in the above description.

#### Train Accidents in the United States in June.

##### COLLISIONS.

###### REAR.

2d, on Central of New Jersey, at Wilkes-Barre, Pa., a passenger train standing at the station was run into at the rear by a freight. Most of the passengers got out of the car, but one, on the platform, was badly injured.

4th, on Philadelphia, Wilmington & Baltimore, near Bellevue, Del., a freight train broke in two, and the rear portion afterward ran into the forward one, wrecking 3 cars. Two brakemen were injured.

6th, on Norfolk & Western, near Bedford City, Va., a freight train descending a grade broke in two, and the rear portion afterward ran into the forward one, wrecking about 30 cars of coal and destroying 300 ft. of a trestle bridge. A brakeman was killed.

12th, on Lake Shore & Michigan Southern, near Goshen, Ind., a freight train broke in two, and the rear portion afterward ran into the forward one, making a bad wreck. One brakeman was killed and 4 other trainmen were injured.

19th, on Burlington & Missouri River, at Friend, Neb., a passenger train ran into a string of empty cars which

had been blown by a high wind from a siding to the main track, making a bad wreck. A tramp was killed.

20th, on Pennsylvania road, near Wall, Pa., a west-bound freight train ran into the rear of a preceding freight, derailing two cars, which fell upon the east-

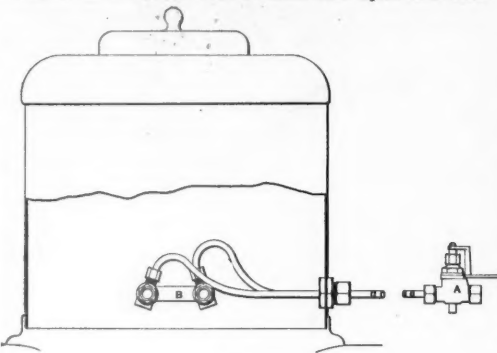


Fig. 2.

bound track. Passenger train No. 20 came along a moment afterward and its 2 engines and the first 4 cars were derailed. One of the enginemen was injured.

22d, 1 a. m., on Central Vermont, at Montpelier Junction, Vt., a passenger train ran into the rear of a preceding freight, which had been delayed in entering a side track, wrecking the caboose. Two drivers in the caboose were killed and a third fatally injured. The passenger fireman was injured. There was a dense fog at the time of the collision.

23d, 9 p. m., on Chicago, Milwaukee & St. Paul, near Davis Junction, Ill., a freight train descending a grade broke in two, and the rear portion afterward ran into the forward one, making a bad wreck, a portion of which fell upon the westbound track in front of a westbound freight train, which was derailed and wrecked. The wreck took fire and 24 loaded cars were burned up. One fireman was killed and an engineer and a fireman injured.

And 10 others on 7 roads, involving 15 freight trains.

###### BUTTING.

4th, on Chesapeake, Ohio & Southwestern, at Wingo, Ky., a passenger train collided with a freight, wrecking both engines. One fireman and a tramp were killed.

6th, on Long Island road, at East New York, N. Y., butting collision between a passenger train and a coal train of the Kings County Elevated, damaging both engines. Two passengers were injured. It is said that the Kings County train, which had trackage rights over the line of the road, had not been notified of a change in the time-table.

15th, on Chicago & Alton, near Alton, Ill., butting collision between a passenger train and an empty engine, damaging both engines. One engineman was injured. It is said that the runner of the light engine was a new man on that end of the road and failed to keep track of the passenger trains on his time-table.

19th, on Lake Shore & Michigan Southern, at Swanton, O., eastbound passenger train No. 22 ran over a misplaced switch and into the head of a freight train standing on the side track, damaging several cars in both trains. The passenger fireman was injured.

27th, on Louisville & Nashville, near New Castle, Ala., butting collision of freight trains 71 and 72, badly dam-

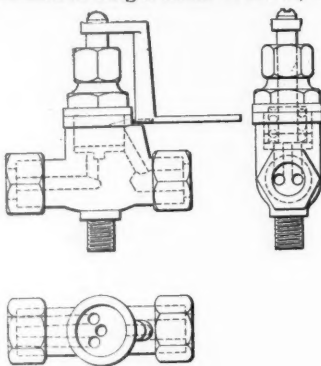


Fig. 3.

aging both engines and 6 cars. A tramp riding on a truck of one of the cars was killed.

28th, on Southern Railway, near Heflin, Ala., a freight train collided with a runaway freight car which had escaped from a side track on a grade, wrecking 11 loaded cars. One brakeman and one tramp were killed and 3 other tramps fatally injured. It is said that the runaway car had been released by tramps or other malicious persons.

And 5 others on 5 roads, involving 10 freight trains.

###### CROSSING AND MISCELLANEOUS.

5th, on Pennsylvania road, near Devon, Pa., collision of freight trains; engineman injured.

8th, 10 p. m., on Florida East Coast road, at Miami, Fla., a passenger train ran over a misplaced switch and collided with two engines standing on the sidetrack, badly damaging all the engines. Five passengers and one employee were injured.

14th, on Baltimore & Potomac, at Baltimore, Md., a freight train ascending a grade in the tunnel south of the Union station was suddenly stopped by the rupture of an air-brake hose behind the fourth car. The shock broke a coupling in that portion of the train not held by the air-brakes and about 20 cars ran back down the grade. One of the brakemen had been killed by the shock, and the man at the rear end, who did not succeed in getting any brakes applied until the cars had moved back some distance, was unable to stop them; and they ran back through the Union station to Calvert station on the Northern Central, where they collided with a passenger car standing at the end of a platform track.

27th, on Union Pacific, Denver & Gulf, near Bierstadt, Col., a passenger train collided with a switching engine, doing considerable damage. The engineman of the passenger train was killed, the fireman and baggageman fatally injured and the two men on the switching engine seriously injured.

And 7 others on 6 roads, involving 1 passenger train and 13 freight and other trains.

##### DERAILMENTS.

###### DEFECTS OF ROAD.

29th, on International & Great Northern, at Green, Tex., a freight train was derailed by spreading of rails and 10 cars were ditched. A brakeman was injured.

And 5 others on 4 roads, involving 2 passenger and 3 freight trains.

###### DEFECTS OF EQUIPMENT.

3d, on Seattle, Lake Shore & Eastern, near McMurray, Wash., a passenger train was derailed by the breaking of a flange of one of the wheels of the engine, and the engine was overturned. The engineman was badly injured. He would have been scalded but for the fact that the tender was crushed by one of the driving wheels, allowing the water to pour upon him.

19th, on Lake Street Elevated, Chicago, at Hamlin avenue, a passenger train was derailed by the feed arm of the electric motor, which was broken and fell upon the track.

And 6 others on 6 roads, involving one passenger train and 5 freight trains.

###### NEGLECT IN OPERATING.

7th, on St. Louis & San Francisco, at Wentworth, Mo., a freight train was derailed at a half opened switch and the engine and 10 cars were wrecked; engineman and one brakeman killed.

8th, on Boston & Maine, at Rockport, Mass., a passenger train approaching the station at uncontrollable speed ran off the end of the track, making a considerable wreck; one passenger injured.

20th, on Lake Street Elevated, Chicago, near Rockwell street, a passenger train was derailed at a curve and the foremost car fell to the street below. The motorman was killed and four passengers were injured.

And 3 others on 3 roads, involving 3 freight trains.

###### UNFORESEEN OBSTRUCTIONS.

2d, on Northern Pacific, near Grey Cliff, Mont., a passenger train was derailed by running over some cable

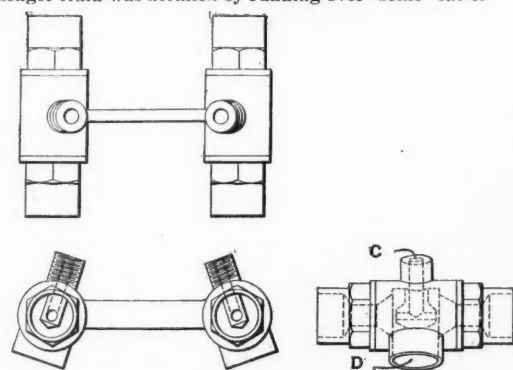


Fig. 4.

and two tramps were killed. One passenger was injured.

7th, on Chicago, Peoria & St. Louis, at Stoeher's, Ill., a passenger train was derailed by running over a cow, and the engine and baggage car were ditched. The engineman was injured.

13th, on Cincinnati, New Orleans & Texas Pacific, near Sadierville, Ky., a freight train traveling at high speed was derailed by running into a drove of horses, and the engine and 15 cars were wrecked; engineman and fireman badly injured.

22d, on Great Northern, near Kootenai Falls, Mont., three cars of a freight train were derailed by running into a landslide. The report that 12 cars were carried down into the river and over the falls, killing 12 tramps, was a pure fabrication.

23d, on Maine Central, near Freeport, Me., a freight train was derailed by a large stone which was dislodged by a blast of dynamite used in connection with excavations for a second main track and lodged upon the track just ahead of the moving train. The engineman and fireman were injured.

30th, on Savannah, Florida & Western, near Morristan, Fla., a passenger train was derailed at a washout and the engine and three cars were ditched. The baggageman and one passenger were injured.

And 5 others on 5 roads, involving 3 passenger and 2 freight trains.

###### UNEXPLAINED.

1st, on Pittsburgh, Shenango & Lake Erie, near Girard Pa., a passenger train was derailed and the engineman and fireman injured.

4th, on Northern Pacific, near Livingston, Mont., a passenger train was derailed and the engine and 5 cars were ditched. Three tramps were killed and several trainmen injured.

11th, on Central of New Jersey, near Audenried, Pa., the engine and several cars of a coal train were derailed, making a considerable wreck, and another train soon after ran into it. One engineman was injured.

25th, on Chicago, Milwaukee & St. Paul, near Hayesville, Ia., a freight train was derailed and 13 cars were wrecked. Two men stealing rides were killed.

29th, on Burlington & Missouri River, near Deadwood, S. D., the engine of a freight train was derailed and fell down a bank. The engineman was badly injured.

And 13 others on 13 roads, involving 1 passenger train and 12 freight and other trains.

#### OTHER ACCIDENTS.

19th, on New York, New Haven & Hartford, near Jamaica Plain, Mass., a car in a passenger train was damaged by a stone hanging from a derrick which was swung against the moving train. Four workmen were injured and several passengers were slightly hurt.

28d, on New York Central & Hudson River, at Utica, N. Y., the locomotive of a freight train was wrecked by the explosion of its boiler; engineer and fireman fatally injured.

And 3 others on 2 roads, involving 2 passenger trains and 1 freight.

A summary will be found in another column.

#### Electric Locking for Railroad Signals.

At the meeting of the Railway Signaling Club in Chicago, May 12, the principal discussion was on the paper on Electric Locking, which was read by Mr. V. Spicer. This paper was reported in the *Railroad Gazette* of May 15, page 337.

Mr. Spicer, being asked what form of electric locking

he recommended, replied, the track circuit, to lock the lock-levers on clearing the signals for a route. For a high speed train the lock should be operated when the distant signal is cleared, but when a train approaches with the distant signal at caution the lock should not operate until the train passes the home signal. The best method of arranging the details of locking is open to a great deal of discussion.

In the discussion of the relative merits of electric locks and derailing switches, Mr. Gillingham emphasized the point that the most damage arises from carelessness of engineers in running trains off derailing switches and not from collisions on the crossing proper.

Mr. Salmon deemed electric locking important as providing safeguards not otherwise attainable. There should be enough of it at least to prevent the setting up of conflicting movements on high-speed routes. The principal difficulty is the complication of tracks at some plants. Where there are many involved tracks it is very difficult to keep a track circuit in good shape. In many yards the tracks are allowed to settle into the mud and short circuits make much trouble. Members of the club should, however, persist in having electric locking installed and well maintained and thus make it popular. Track-instrument locking is practicable only at simple crossings or plants. Where there is much switching it is likely to cause a great deal of trouble.

Being asked about his observations in Europe, Mr. Salmon said that signal engineers in France, Germany, Belgium, Holland and England were very much interested in the track circuit, but they had not studied the subject thoroughly and made many unintelligent experiments.

Mr. Sperry asked for the views of members as to how to deal with two trains, one closely following another, where there is a track circuit, for locking, extending from the derailing switch over a crossing and to the derailing switch on the farther side. On roads not using the block system trains thus follow and the second one will proceed on the signal which is pulled off for the first one. Mr. Elliott answered that trains should not be allowed to follow one another so closely. Electric locking is not designed to provide against such a contingency.

Reference being made to the use of hand apparatus for releasing electric locks (to avoid delays) and to the fact that the abuse of such releasing apparatus has sometimes caused the abandonment of electric locking, Mr. Spicer defended it; if it is used under proper regulations and by well disciplined men it is useful and adequate.

#### Gasoline Inspection Cars.

The gasoline motor for inspection cars is a recent departure which promises to be cheap and efficient. We described one of these cars made by the Kalamazoo Railroad Velocipede & Car Company in our issue of May 17, 1895. That company has lately brought out what is styled the "improved 3 H.-P. gasoline motor inspection car," an engraving of which from a photograph, appears in this issue. The car, it will be seen, is a com-

compact and well-designed vehicle. The motor used is of the two-cycle type having an impulse at every revolution of the crank shaft. The following is a brief description of the action of the motor:

The motive power is from the explosion of a mixture of gas and air in the upper end of the cylinder. The up-stroke of the piston draws in a charge of air and gasoline through a mixing valve into the crank chamber of the engine. The down-stroke compresses the gas slightly in the base, and when the piston is near the end of the down-stroke a port is opened in the cylinder head, which permits the compressed gas in the crank chamber to pass through a passage at the side of the cylinder through open port in the cylinder head to the upper end of the cylinder. The next up-stroke compresses the gases and when the piston is near the end of the up-stroke the charge is ignited by an electric spark and drives the piston down. When the piston is near the end of the down-stroke it uncovers an annular port on the side of the cylinder which permits the exhaust to escape, and immediately after the exhaust port opens, the port in the cylinder head is opened, admitting a new charge, at the same time driving the balance of exploded charge out of the exhaust port. This is repeated at every revolution.

The generator is an angle check valve with the inlet opening upward, the gasoline pipe being connected with

amount of gasoline and air to obtain any desired speed. The valve and other parts of the power device are carried directly upon the cylinders, thus making the engines and their parts self-contained.

#### Blind Tires for Locomotives.

At the May meeting of the New York Railroad Club an important discussion was held on the question "Is it good practice to use blank drivers on locomotives?" We reported the discussion very briefly in our issue of May 29. A pretty full report follows.

Mr. MOLINEUX (Lehigh Valley) . . . The present practice as to engines with six drivers is concisely stated in a letter from the Baldwin Locomotive Works as follows: "It has been almost the universal rule in American practice, when three pairs of driving wheels are used under a locomotive, to make one pair with blank tires. In mogul engines the middle pair is made blank. In 10-wheel engines the middle pair is blank, if the swing truck is used under the front of the engine; but if the truck has no swing bolster, and is only an ordinary swiveling truck, then the front driving wheels are made blank."

The supposed advantages of blank drivers, as far as I have been able to learn them, are less strain on the track in passing around curves, the avoidance of flange friction on curves as to the pair of blank drivers, and less strain on the engine generally.

Certainly, all flange friction is avoided on the pair of blank drivers, but the tendency of the engine to travel in a straight line (that the flanges resist) is not destroyed, but only transferred to the flanges on the other drivers, causing them to do additional work.

Most builders of engines seem to favor blank drivers, probably believing that it is easier on the engine, but this hardly seems to be the case, as the riding qualities of an engine are certainly improved by using all flanged drivers. There is really no danger of the track being too tight on account of curvature.

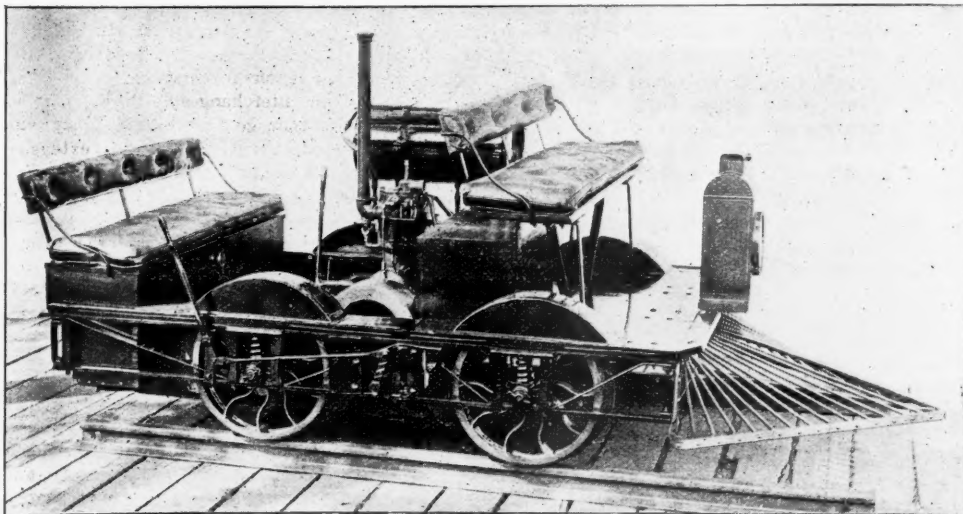
Makers of locomotives, in their printed descriptions, rarely give any information as to flanged or blank tires, but it is of interest to note that instead of using the term "rigid wheel base" they say "driving-wheel base," thereby showing that drivers are not expected to be in line and axles parallel in passing around curves.

One road represented here to-night mounts the tires on its consolidated engines as follows: Front tires, 53 1/2 in.; main tires, 53 1/2 in. (1/2 in. wider); third pair 53 1/2 in. (1/2 in. wider); back pair, 53 1/2 in. They give side motion between inside hub and box, on new work 1/2 in. clearance, and have no trouble from sharp flanges. These engines pass nicely around a 23 deg. curve in main line at a slow point, and around a 14-deg. curve in main line which is not a slow point.

Some of the advantages of having all the drivers flanged are:

*First.* In practice it has been found that fewer derailments occur with all flanged drivers. As a natural consequence of this, the engineer feeling more confidence in his engine will, where high speeds are required, be far more likely to make his time than with blank drivers. Recently, in speaking to a former engineer, noted for fast running, who now holds the position of road foreman of engines, this point was strongly brought out, and he said that engineers now making fast time in express service with 10-wheel engines, all drivers flanged, would feel, if placed on engines having one pair of blank drivers, such a lack of security that trains behind time would be the result.

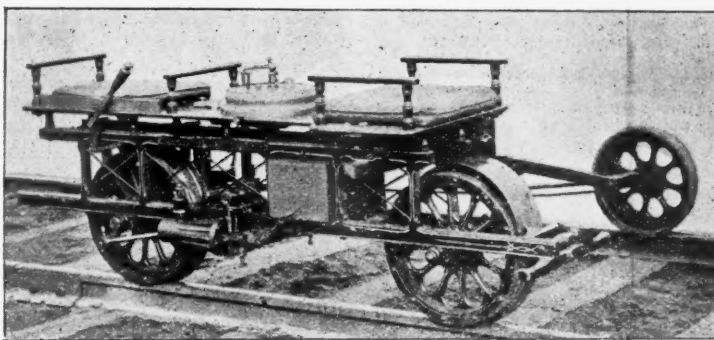
*Second.* In a wreck much easier to replace on the rails, and take to the shop in a crippled condition. A six wheel switch engine, all flanged drivers, was pushing a



The Kalamazoo Gasoline-Motor Inspection Car.

the side of the valve by an opening for gasoline through the valve seat, this opening being regulated by a needle valve. In operation, the air is drawn through the check valve, at the same time drawing the gasoline through the needle valve. The charge is then heated by passing through a chamber around the exhaust pipe, which thoroughly vaporizes the gasoline before it enters the engine. The quantity of gasoline is regulated by the needle valve.

A lighter inspection car than that just described, but one which also uses gasoline as the motive power, is being sold by the Sheffield Car Company, of Three Rivers, Mich. The engraving shows the device, which is essentially a double gasoline engine mounted on the Sheffield velocipede car. The car, together with the equipment, weighs under 250 lbs., but the motor is powerful enough to carry a load of two men up an ordinary grade at a speed of from 15 to 20 miles per hour. The driving wheel is equipped with the Sheffield concave steel tire, which constantly tends to hold the car upon the track even at high speeds. All the wheels have forged steel hubs, wood



The Sheffield Gasoline Inspection Car.

centers and steel tires. The details of its construction and action are given briefly as follows:

The engine is fitted with trunk pistons, and is so arranged that an impulse of propelling movement is given to the axle at every revolution. This impulse comes from the explosion of the proper mixture of air and gasoline vapor in the cylinders by means of an electric spark. The spark is supplied by hermetically sealed chemical batteries, and the current is increased by means of a developing coil. A hand switch makes the connection, closing the circuit at will. The mechanism operating these sparking or contact parts is very simple and made of case-hardened steel. The gasoline is carried in a sealed copper reservoir which will contain enough to run 60 to 75 miles on a road where the average grade is small, and an extra supply can be carried in an additional reservoir to be used in case of necessity. The admission of gasoline and air to the cylinders is such that the proportion of each can be varied, the device being so constructed that the operator can see exactly how much of each is being used and can control them separately by means of levers which are within convenient reach.

In starting, gasoline is turned on, the air valve is opened and the switch closed. It is necessary to run with the car a few steps to get it under motion, when the operation of mechanism becomes automatic, and the operator stepping aboard has only to regulate the proper

freight train on a main line, when one of its rear drivers dropped off, due to defective axle. The rear axle was blocked up, and engine went to shop under her own steam. Had the center drivers been blank, this could not have been done. A 10-wheel engine with forward drivers blank was wrecked, head end and truck being destroyed. Crew started to take engine backward to the shop without a truck, and all went well until, on account of bridge repairs, the engine had to be run forward over a cross-over. Without truck, engine would not curve the cross-over. The blank drivers would drop off the rail every time an attempt was made. Pull the engine back, and the blank drivers would mount the rail readily. After repeated trials a truck was secured, and engine made the cross over easily; but this caused a delay of several hours.

*Third.* A flanged tire is stronger than a blank one, and, being less liable to break, can be run longer.

*Fourth.* More mileage account, fewer sharp flanges: With all flanged drivers, the wear will be more nearly equal on all, and the full mileage of the tire is available. With center drivers blank, the forward drivers are liable to have sharp flanges, necessitating the turning down of all the drivers to preserve a safe flange for forward drivers. One of the most crooked roads in the country re-

(Continued on page 527.)



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#### EDITORIAL ANNOUNCEMENTS.

**Contributions.**—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

**Advertisements.**—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

The Postmaster-General's order concerning the transmission of railroad letters in baggage cars without the payment of postage has been the subject of a number of conferences of railroad men during the past week, and it is reported that a conference will be held at the Post Office Department in Washington some day this week when the officers of some of the principal railroads will endeavor to arrive at a more precise understanding of what the Postmaster-General's circular means.\* We have heard of no definite action by any road except by certain St. Louis companies which, according to one of the newspapers of that city, have sent out the following circular:

"The attention of railroad companies has been called by the Post Office Department to an act of Congress, prohibiting the carrying in baggage cars of any mail except that pertaining strictly to the business of each railroad, as between its officers and employees.

"You will, therefore, please understand and notify all concerned that no mail is to be forwarded in baggage cars of this company that is addressed to any person whatsoever at points off the line of the railroad, no matter whether to one of our own employees or not. No mail will be received from connecting lines, to be carried in the baggage cars of this company, whether addressed to the officers or employees of this company or not. In other words, all railroad mail carried in baggage cars must be confined strictly to communications between the officers, agents and employees of this company, located on the line thereof, and must pertain only to the business of the company.

"All printed matter, and large packages for connecting lines, can be handled by express; but any letters explanatory of the same must be sent through the United States mail.

"As there is a heavy fine for the violation of this law, not only against the company, but also against any employee offending, it is necessary that all concerned should observe strictly the above instructions."

Press dispatches from other cities would seem to indicate that the foregoing circular correctly interprets the present attitude of the Post Office Department; that is to say, no objection is made on the part of the government to the transmission of strictly railroad letters over a single road. It is to be borne in mind that the government monopoly has never been applied to printed matter or to anything except what is usually termed first-class mail.

It remains to be seen how well the railroads will carry out the idea embodied in this St. Louis circular. The prohibition of all transmission from one road to

\* A committee of legal officers of Western railroads, at a conference held last week, formulated an argument to be presented to the Postmaster-General. They will maintain that it is legally permissible to carry mail matter otherwise than between officers and employees if the matter pertains to the carrying road's business, whether or not such business be that of the carrying railroad alone or be joint with others; for example, time-cards, folders or advertising matter of the carrying road for distribution off its line; way-bills, tracers, claims of the carrying or connecting road upon the other; joint tariffs or agreements to which the carrying road is a party, and other matter in the carriage of which the carrying road has a direct interest otherwise than through any reward or compensation to be received from another for the carriage, because the matter relates to the carrying road's own business. On the other hand, it is the opinion of the committee that the existing law forbids a railroad to carry for any other railroad or for any other person or corporation, in consideration of compensation or reward of any nature, any first-class mail matter not relating to the carrying road's own business. Whether such carriage is lawful if done without compensation and whether the acts of Congress apply to mail matter below first-class are, in the opinion of the committee, uncertain questions under the law, which is a good reason for refusing to carry for others, even without compensation, any mail matter not pertaining to the carrying company's own business.

another, if strictly carried out, will simply make much inconvenience for the railroads without any corresponding gain to anybody. Take, for instance, the carriage of freight way-bills from New York to Chicago by passenger train, of which there must be a bushel or two sent out every night. According to the new regulation, these going over two roads, must be sent by mail, or at least must be enclosed in government stamped envelopes, the stamps on which would have to be of pretty high denominations, as these documents are very bulky. But rather than pay postage on such heavy packages it would be very natural for the railroad, say the New York Central, to send all of its way bills, originals and copies, to its own agent at Buffalo, to be handed over by him to the agent of the Lake Shore & Michigan Southern, who would then proceed to send them to the agent of his own road in Chicago. This procedure would be perfectly in accordance with what is now supposed to be the wish of the Post Office Department, and yet it might be looked upon as a palpable evasion of the prohibition against the transmission of joint letters. In the case of the Pennsylvania it might be ruled that the road east of Pittsburgh, being sole owner of the road west of Pittsburgh, might be excused from going through with the farce of redirecting at the junction, and Baltimore & Ohio way bills from Philadelphia to Chicago would clearly be exempt. It is said that one reason why the Postmaster-General has taken up this subject at this time is because the railroads have carried a great deal of matter for private car lines, and for the railroad associations. To carry the letters of the private car companies is wholly unreasonable; but then, for that matter, it is unreasonable for the railroads to make such one-sided contracts as they do with the private car lines; at least, in the majority of cases, they simply waste earnings by so doing. If a road suffers on account of its dealings with these concerns, no one need waste any tears of sympathy upon it. But the railroad associations are really parts of the roads themselves, and there can be no reasonable distinction between an association letter and one of the individual roads. Again, most or all letters from a railroad officer to, say, the Commissioner of the Joint Traffic Association, or to the manager of a private car company, deal with the business of the road, and may properly be sent through the agent of the road at the city where the association or car company is located; why cannot letters in the opposite direction on the same business be sent through the same channel? Why should statements from one auditor to another pay postage? Business between the Chicago & Alton and the Pennsylvania is exchanged at Chicago, and the auditors of the two companies, in settling for that business, can communicate through their respective Chicago agents, and thus comply with the government regulations; but wherein is any one advantaged? Why not let their statements be addressed direct?

Whatever postage a railroad pays (or, as a member of an association, helps to pay) on letters carried on its own baggage cars (not in mail cars) may be looked upon as a tax to support mail-routes and postoffices in thinly populated districts, which cost more than they earn; and the question is whether this tax is equitably assessed. On the face of it two cents for each ounce letter would seem high. The government does not aim to make a profit from mail carrying, and if it carried railroad letters in mail cars and charged the railroads only cost rates practically the whole of the postage money would have to be paid back to the railroad for transportation. The rate of two cents an ounce pays approximately the cost of (1) carrying, on the car or stage coach; (2) of maintenance of post offices, and (3) of free delivery in cities. The last two items should not be charged on railroad letters. To do so would be, we say, the same as levying taxes for the support of the Post Office Department; and that, as every one knows, is not in accordance with the theory upon which the government postal service is supported. It is not the intention to tax all the people for this object, but only those for which the government performs a service, and in proportion to the service performed for each.

We have had occasion now and then to record the adoption by English railroads of certain American ideas, which we trust will be liked by English passengers and be found useful and valuable by the railroads; but we now read of the adoption of an American idea which we cannot very heartily recommend, mileage tickets. According to *Transport* the North Eastern Railway has put these on sale at £5 5s. for 1,000 miles, or about 14d. per mile. They are for use in first-class cars only and the rate is about 20 per cent. less than for regular first-class tickets. The coupons may be used by a member of the purchaser's

family or by his guest, but in such a case a certificate signed by the purchaser must be presented, and in all cases the coupons are to be exchanged at the ticket office for a regular ticket. For a ride of less than 10 miles 10 coupons will be detached. Applications for these tickets must be made in writing to the Superintendent and a book of 100 blank certificates (for authorizing your wife to use the ticket) costs 6d. additional. The discount on these tickets—20 per cent.—is pretty liberal, more so than that on the more conservative American roads. Ten per cent. would be large enough, and five per cent. would be better. Mileage tickets have been popular in America largely because they saved the bother of going to the ticket office every trip, and since certain roads have taken away that element of convenience, the number sold has fallen off. It would be unkind to say that our English friends waited until our mileage ticket scheme was well tied up with red-tape before deciding to use it, but it is noticeable that they have gone a trifle further than any American road in the way of making it difficult to use the tickets. If the drummers of England ride much in first-class cars, they will now want an interchangeable mileage ticket of course; or, if they go mostly third, they will probably not be too modest to request an extension of the new tickets to all classes of cars, with corresponding rates. If we may judge by the experience of the Drummers' Association in this country the task of getting the English railroads to issue interchangeable tickets will require a good deal of time and diplomacy, and we suggest that a Chicago reporter be taken over to aid in working up public sentiment.

#### A Car-Load Rate Case.

When doctors disagree who shall decide? In matters of law, as affecting railroad transportation, many people now take the Interstate Commerce Commission for their doctor, and the satisfaction felt by merchants and shippers when the Interstate Commerce law is found to be applicable to any of their troubles seems to be an abiding source of courage and hope. Whatever difficulties may arise as to rates or facilities, if some one says that the Interstate Commerce law affords ground for getting them settled, an application to the Commission is at once set on foot, and everybody sits down contented—for a while. Of course, if a shipper has a really burning grievance he does not trust to an association or a freight bureau secretary to manage his case but takes up the cudgels himself; but the course we have described is what has been observed to be taken in Boards of Trade many times in many cities. But there are rival doctors. The Constitution of the United States limits the powers of the Interstate Commerce Commissioners to interstate traffic, and the commission of an individual state does not always agree with the Washington board, so that we are reminded now and then that the state cannot do everything; the law is often inadequate and beginning a controversy does not always insure its satisfactory ending. The discovery of this fact—that we not only lack the laws needful to meet all our wants, but also lack the wisdom necessary to frame them—often comes as a surprise to people who think that the railroads, being the creatures of the State, must be subject to the most perfect control by their creator; and a case which seems to be of this kind has recently been reported from St. Louis. As reported in the *Galveston News*, it appears that

Some time ago St. Louis merchants made a complaint to the Southwestern Traffic Association that the difference between the carload rates and the less than carload rates to points in Texas was too great; that the less than carload rates should be reduced. The Southwestern Traffic Association brought the matter to the attention of the Texas Commission and a meeting was held at Austin to consider the matter. The Commission plainly told the interested railroads that the difference was not too great and any attempt to narrow the difference would be resisted by the Commission. The Association therefore declined to make any changes in their rates. The Business Men's League of St. Louis have, therefore, filed a petition with the Interstate Commerce Commission stating their grievances in this respect. The matter has been brought to the attention of the Texas Railroad Commission and they will probably intervene. The petition is styled the Business Men's League of St. Louis vs. The St. Louis, Iron Mountain & Southern, the Missouri, Kansas & Texas, the St. Louis & San Francisco, and Aldace F. Walker and John J. McCook, Receivers. It will be observed that the defendant companies are all St. Louis roads, interested in doing business from St. Louis. It is usual in such cases for connecting lines to be made parties to the suit, and it looks as though the above defendants will not make an active defense.

The petition alleges that rates from St. Louis to Texas are unreasonable, both absolutely and relatively, and that L. C. L. shipments are charged from 28 1/2 per cent. to 260 per cent. more than C. L. shipments. The regular class rates are: First class, \$1.30; fifth, 70 cents, and the others in proportion; but of the freight sent to Texas, complainants estimate that 85 per cent. is carried at commodity rates. It is

charged that the railroads make the class rates to Texas abnormally high, apparently as a basis for making exceptions for special commodities in carloads and for keeping shippers of small quantities out of the trade. It is claimed that a large proportion of the commodity rates could be dispensed with and the goods covered by a properly adjusted tariff of class rates, without reducing the revenue of the railroads. The petition has been prepared by some one proficient in rate making, and in summing up he prays:

First, that the class tariff be modified so that the fifth-class rate (C. L.) from St. Louis to Texas common points be made 50 cents per 100 lbs.; second, that the fourth-class rate (L. C. L.) be made only as much higher as the difference in cost of service would justify, say not more than 7 cents per 100 lbs., equal to 14 per cent.; third, that the third, second and first-class rates be made on a reasonable graduation, considering the classification features of the traffic to be carried; fourth, that a ruling be made that when a commodity rate is made changing the carload rate, the less than carload rate shall also be correspondingly changed.

From the opening statement of the *Galveston News* it will be seen that public officials can take narrow or sectional views, as well as merchants and other people. Texas is an empire, but not such a powerful one but that her Railroad Commissioners believe it chants the same as would be done in any little province or city. If the jobbers of Texas can handle every case of dry goods coming into the state instead of letting one case at a time go direct from New York or St. Louis to the retailer it will seem to promote the prosperity of Texas, for it will make bustle and activity, and the Commissioners of the state will no doubt deem it their duty to advocate the cause of the jobbers; but whether this is actually for the best interests of the whole people, including the retailers and the consumers, is not so easy a question, and the Interstate Commerce Commissioners will probably find plenty of scope for their abilities as rate-making experts in the attempt to settle it. The merchants of St. Louis will of course maintain that the cost of rehandling goods at a Texas jobbing center is a waste of money and will no doubt reinforce the argument with evidence as to the good effects on Texas (mercantile) society of having St. Louis drummers go into every hamlet. The other side must show the economy of carrying freight in full carloads and the public benefit of providing the retail merchant with large stocks of merchandise not far from his home, from which he can quickly make easy and intelligent selections.

With claims so conflicting the only safe ground for a railroad to take in fixing differences between C. L. and L. C. L. rates is economy of service. The difference will always be pretty sure to seem to favor either the retailer or the jobber, and as the carrier has no justification for favoring either party, he must be able to give reasonable explanations for the basis of all his rates. This is not easy, even with the fairest intentions, and to satisfy both State and Federal officials and St. Louis and Texas wholesalers, it will be necessary to go into details pretty fully. In the well-known cases of Thurber, Greene and Leggett against the trunk lines leading west from New York, decided in March, 1890, which were based on the same ground as this, Commissioner Schoonmaker, after carefully considering several bushel-baskets of testimony, refrained from attempting to fix the proper relation between carload and L. C. L. rates. He decided that the differences then in force were too great and ordered them made less, but did not say how much less. In those cases, as in the present one, a State Commission was interested, Mr. Dey, of Iowa, appearing before the Interstate Commerce Commission to argue against the claims of the New York wholesalers who wanted to ship single half-barrels of sugar to every little town in Iowa at the same rates they were paying for carloads. Mr. Dey made a strong argument, but the decision was against him.

The St. Louis complaint incidentally illustrates one of the cheerful features of the task of making a single uniform freight classification for the whole of the United States. The Southwest has a classification, covering a large territory, but yet according to the claim here made, 85 per cent. of the merchandise, in one direction, goes under special rates supplementary to those shown with the classification. It is quite possible that, as the St. Louis people claim, there ought to be fewer of these special rates; but even after making all due allowances, there are, doubtless, a great many commodities which can be moved such long distances only at rates the basis of which would be too low to be used in making a regular tariff for all journeys, short and long. To at once substitute for these commodity rates a tariff dealing with all towns throughout the country on the same terms would, indeed, as Mr. Bird has said, be possible only with a government authority which could be sufficiently distant and impersonal to turn a deaf ear to all complainers, however just their claims.

#### Railroad Pooling.

Hon. Martin A. Knapp, of the Interstate Commerce Commission, has written an excellent essay favoring the legalization of railroad pools, as proposed in the Patterson bill (which was passed by the lower House of Congress, but was never taken up in the Senate). This essay appears in the *Annals of the American Academy of Political and Social Science*, No. 179, copies of which may be had of the Secretary of the Academy, 3705 Locust street, Philadelphia, for 25 cents each.

Mr. Knapp's treatment of the subject is broad-minded, temperate and scholarly. He carefully elaborates the logic of the proposition that the management of highways is a public function; that railroads are highways and that the sovereign delegates their management to corporations for reasons of expediency. If the state operated railroads directly not the slightest discrimination would be for a moment tolerated, and of course placing the business in the hands of private corporations does not abrogate the principle on which this view is based. The prevention of discrimination is, however, a most difficult task. The attempt to secure stable rates while retaining the benefits of competition has produced a condition under which grievous injustice has been done. The railroads collect an immense sum every day, which is in the nature of a tax, and yet 60 per cent. of our railroad mileage pays no dividends on stock. The present state of things cannot be reconciled with any just theory of railroad operation. The supposed benefits of competition are greatly exaggerated. To the great majority of people railroad transportation is still a virtual monopoly. Between great cities competition has had a powerful effect and has affected rates to non-competitive points, but the limit of this advantage to interior points has been reached.

Discarding government ownership as out of the question and universal consolidation as equally impracticable, the writer finds co-operation between rival railroads the only method of escape from the difficulties of the present situation. He finds no occasion for specific and exceptional securities against the asserted dangers of legalized pooling.

"It matters not whether an existing rate is maintained by a single road or by associated roads operating under an agreement for a division of the business to which that rate is applied. In either case the question of public concern is whether that rate is reasonable, whether it is alike fair to those who pay it and those who receive it, whether it is relatively just as between different communities and different articles of traffic. The people are not interested to know how tonnage is divided or aggregate earnings apportioned, but they are vitally interested and rightfully entitled to relief, if transportation charges are excessive or unfairly adjusted. The constitutional power of Congress to prevent exactions and correct inequalities is no longer open to question. If that power finds expression in wise and adequate laws, whereby charges of wrong-doing may be promptly investigated, and the determinations of the tribunal to which that duty is delegated be capable of speedy enforcement, the railroads may safely be permitted to make pooling agreements, and the wisdom of such a policy will be demonstrated by its operation. What is wanted, then, when current rates are challenged, is authority to adjudge with some degree of finality what rates are just and reasonable in each such case, without regard to the origin of those rates or the relations of the carriers by which they are maintained. If ample means are provided for correcting ascertained injustice in the charges of a single line, there is no reason to doubt that the same means would be equally efficient in dealing with the charges of associated lines. The questions which affect the public interest would in nowise be changed, either in their nature or mode of treatment, by the circumstance that railroads were allowed to co-operate with each other in performing their public duties. In my judgment, therefore, the amendments to the statute most needful to accomplish its general purpose constitute the principal and important conditions upon which pooling agreements should receive the sanction of law."

In other words, if the other provisions of the Interstate Commerce law can be enforced, the anti-pooling clause may be dispensed with. But as the commercial theory of transportation has not yet been wholly discarded it is well to give the Interstate Commerce Commission power to disapprove pools, a pool to be non-enforceable in such case until a competent court directs its restoration; but Mr. Knapp does not believe that so drastic a remedy will ever be needed.

The paper at some length voices the wish of the Interstate Commerce Commissioners in respect to their powers as an investigating body. The Commission should have the powers of a court of first resort, higher courts having the power to reverse its decisions only on discovery of some error in the record plainly prejudicial to the defeated party. The strengthening of the Commission in this direction is urged as a pressing need. Mr. Knapp also calls attention to the difference between offenses by rate-cutting and offenses in rate-making. Rate-cutting, being distinctly illegal, must be punished under the criminal law, the same as other punishable offenses. The more important and beneficial office of the Commission is to prevent injustice in published rates.

The country is to be congratulated on the appearance of this paper from an individual commissioner, especially as the composite productions of the Commission as a whole—that is, its annual reports—generally appear to have been subjected to more or less trimming to make them acceptable to all the members, and to have lost a good deal of force by the process. The feeling that in permitting competing railroads to pool their earnings the government would be conferring a great and unmerited favor, has been apparent, on one side, in all the discussion on the subject since a law to legalize pooling was first proposed; and that feeling naturally led to a de-

mand that the favor, if granted, should be accompanied by some reservation that would tend to prevent any increase in the prices charged for carrying freight or passengers. It is impossible to devise such a reservation that would be workable, and a little study should convince even a novice that any thing of the kind would be the clumsiest arrangement imaginable for limiting rates; but not many people, even among Congressmen and others who are in duty bound to do so, will make the necessary study, and Commissioner Knapp's study of the subject is therefore timely. In the paragraph that we have quoted, and others, he has shown that the methods and means available for the governmental regulation of railroad rates are just the same whether railroads pool their earnings, or keep them wholly to themselves, or throw them into the sea.

We cannot see, however, that the two demands made by Mr. Knapp, one for legalized pooling and the other for more effective power to enforce the decisions of the Commission, have any necessary connection with each other. Either one could be granted without helping or harming the fortunes of the other. The legalization of pooling could do nothing worse than to stiffen rates to a moderate degree, and every competent student of the present situation believes that it would go no farther in this direction than to stop secret or reckless rate reductions. To give the Interstate Commerce Commission any of the powers of a court would be a change of doubtful wisdom for reasons which we recently had occasion to mention. The findings of fact embraced in a report of the Commission certainly are entitled to the respect due to the work of careful investigators, experienced in a special field, but when it comes to laying down principles, which shall at once become the law of the land, we have reason to move with caution.

The enormous extent of the territory of this country is an obstacle to the establishment of a single tribunal to have jurisdiction throughout the whole of it. Many of the questions to which the Commission could most profitably apply its wisdom are of that nature which, according to the spirit of our institutions, ought to be settled by a jury, and the right of trial by jury suggests the further limitation of "home rule." The litigant in California or Minnesota wants a jury—and a judge, too—from his own state or section. The Supreme Court does, indeed, settle questions arising 3,000 miles away, but only after they have been well thrashed out by local courts. The fate of the decisions of the Interstate Commerce Commission during the past nine years, as they have come before the higher courts, has not been such as to greatly encourage the idea that a railroad court would be a valuable addition to our judicial machinery. The decisions of the Commission have not been "speedily enforced," but, if we may trust the wisdom of the highest court in the land, some of them ought not to be enforced. Involved and difficult questions in other lines of business still have to wait the slow processes of the law, as they have had to for generations past; and while not deprecating any practicable arrangement for avoiding legal delays we feel bound to say that there should be very full discussion of the subject in all parts of the country before any change is made. To speak plainly, we doubt the ability of Congress to wisely act in the matter until the members shall have more fully informed themselves as to the wishes of their constituents.

#### June Accidents.

Our record of train accidents in June, given in this number, includes 40 collisions, 49 derailments and 5 other accidents, a total of 94 accidents, in which 30 persons were killed and 56 injured. The detailed list, printed on another page, contains accounts only of the more important of these accidents. All which caused no deaths or injuries to persons are omitted, except where the circumstances of the accident, as reported, make it of special interest.

These accidents are classified as follows:

COLLISIONS:	Rear.	But-ting.	Cross-ing and other.	Total.
Trains breaking in two.....	9	0	0	9
Misplaced switch.....	0	1	1	2
Failure to give or observe signal.....	2	0	0	2
Mistake in giving or understand-ing orders.....	0	4	0	4
Miscellaneous.....	2	2	3	7
Unexplained.....	5	4	7	16
Total.....	18	11	11	40

#### DERAILMENTS.

Broken rail.....	2	Runaway train.....	2
Loose or spread rail.....	2	Bad loading.....	1
Defective switch.....	1	Animals on track.....	4
Defective track.....	1	Landslide.....	2
Broken wheel.....	2	Washout.....	3
Broken axle.....	3	Malignant obstruction.....	1
Broken truck.....	2	Accidental obstruction.....	1
Too quick application of air-brake.....	1	Unexplained.....	18
Misplaced switch.....	2		
Careless running.....	1		
			49

#### OTHER ACCIDENTS.

Boiler explosion.....	2
Broken side rod.....	1
Other causes.....	2

Total number of accidents..... 94

A general classification shows:

Colli-sions.	Derail-ments.	Other acci-dents.	Total.	P. c.
Defects of road.....	0	8	8	8
Defects of equipment.....	9	3	12	12
Negligence in operating.....	15	6	21	22
Unforeseen obstructions.....	0	11	11	14
Unexplained.....	16	18	34	37
Total.....	40	49	94	100

The number of trains involved is as follows:

	Colli- sions.	Derail- ments.	Other accid's.	Total.
Passenger.....	11	16	3	30
Freight and other.....	59	33	2	94
Total.....	70	49	5	124

The casualties may be divided as follows:

	Colli- sions.	Derail- ments.	Other accid's.	Total.
Killed:				
Employees.....	9	3	2	14
Passengers.....	3	0	0	3
Others.....	6	7	0	13
Total.....	18	10	2	30
Injured:				
Employees.....	18	15	4	37
Passengers.....	8	7	3	18
Others.....	1	0	0	1
Total.....	27	22	7	56

The casualties to passengers and employees, when divided according to classes of causes, appear as follows:

	Pass. Killed.	Pass. Injured.	Emp. Killed.	Emp. Injured.
Defects of road.....	0	0	0	1
Defects of equipment.....	0	0	2	1
Negligence in operating.....	3	13	12	18
Unforeseen obstructions and maliciousness.....	0	5	0	10
Unexplained.....	0	0	0	7
Total.....	3	18	14	37

Sixteen accidents caused the death of one or more persons each, and 19 caused injury but not death, leaving 59 (48 per cent. of the whole) which caused no personal injury deemed worthy of record.

The comparison with June of the previous five years shows:

	1896.	1895.	1894.	1893.	1892.	1891.
Collisions.....	40	40	39	72	75	50
Derailments.....	49	53	67	96	88	109
Other accidents.....	5	4	4	5	2	8
Total accidents.....	94	97	110	173	165	167
Employees killed.....	14	22	22	25	44	50
Others killed.....	16	13	14	15	26	10
Employees injured.....	37	51	74	104	143	130
Others injured.....	19	32	20	96	156	197
Passenger trains involved.....	30	20	35	55	77	58

Average per day:

	1896.	1895.	1894.	1893.	1892.	1891.
Accidents.....	3.13	3.30	3.66	5.77	5.50	5.57
Killed.....	1.00	1.17	1.20	1.33	2.33	2.90
Injured.....	1.53	2.77	3.13	6.67	9.97	7.90

Average per accident:

	1896.	1895.	1894.	1893.	1892.	1891.
Killed.....	0.32	0.35	0.32	0.23	0.42	0.35
Injured.....	0.60	0.83	0.85	1.15	1.81	1.41

Only three passengers were killed in train accidents in June and these were drovers riding in the caboose of a freight train. The number of tramps and other trespassers in this month's record was, however, quite large, bringing the total number of deaths up to 30.

There was no lack of costly and startling train accidents in June, but there was only one that was at all exceptional; that was the derailment on the Lake Street Elevated Road in Chicago, June 20. The most intelligent reports of this accident indicate that it was due to careless running. The derailment occurred on a curve where, it is said, the rule requires the speed to be not greater than 6 miles an hour, but where, in fact, it was in this case much higher than that, estimated by one witness at 25 miles an hour. This train was drawn by an electric motor.

The fast mail train of the Chicago, Burlington & Quincy came near running into the open draw over the Mississippi River at Burlington on June 20, the engine-man having been killed by some accident, presumably by striking his head against a post while leaning too far out of the window. The fireman discovered that the engine-man was dead barely in season to make an emergency stop before reaching the draw, but the attendant succeeded in closing the draw just before the engine reached it.

Near Woodville, Tex., on the 22d, seven men were killed and two fatally injured by the explosion of the boiler of a small locomotive belonging to the Nebraska Lumber Company.

There were a dozen street car accidents in June, half of which occurred in the two cities of Chicago and Brooklyn. The number of persons injured in the 12 accidents was 37, the only fatalities being two, in a runaway at Brooklyn June 7, which was reported in the *Railroad Gazette* of July 17, page 499. Of the other accidents seven were collisions, one being between a passenger car and a street railroad work train. A butting collision on the Washington, Alexandria & Mt. Vernon road blocked the road half a day.

In Philadelphia, on Sunday, June 21, nine men were badly injured, some perhaps fatally, by being squeezed between two street cars which met on adjoining tracks. It appears that the tracks were close together, and that both cars (having transverse seats and longitudinal steps on the sides) were overloaded. These men were hanging on to the sides, and there were so many of them that the loads could not pass each other. The mass was so heavy and compact that it almost stopped the cars.

#### NEW PUBLICATIONS.

*The Engineering Index*, Vol. II, 1892-95. Edited by J. B. Johnson, C. E., Chairman of the Board of Managers and Manager of the Index Department of the Journal of the Association of Engineering Societies. Associate Editors, F. E. Turneure, C. E., C. B. Stewart, C. E., and J. L. Van Ornum, C. E. New York: The Engineering Magazine, 1896. Cloth, octavo, 474 pages. Price, \$4.

This is the second volume of the index notes published from month to month in the Journal of the Association of Engineering Societies for the last 11 years. It covers the period from 1892 to December, 1895, the first volume being for the years from 1884 to 1891. The index is more than a simple recital of titles, each article indexed being

briefly described to show its scope or general character. Summaries or results are sometimes given, but not often. The journals indexed are the publications of the more important engineering societies and the leading technical journals of this and foreign countries. Subjects relating to civil and mechanical engineering are very fully treated. The articles relating to other branches of engineering and economic matters interesting to the engineer, are indexed only incidentally.

During the entire period of publication the preparation of the index has been under the general direction of Professor Johnson. He has been assisted from time to time in the active work of index making by volunteer assistants, all of them, however, technical experts, and generally professors or instructors in engineering colleges. To him and his associates every one who uses the index has reason to be deeply grateful. It has been a taxing work, carried on for many years, a true "labor of love." The only possible reward was the knowledge of doing a useful and needed work, and the appreciation of those having occasion to use such an index. That, of course, includes every working engineer and a large body of intelligent men in other lines. With the publication of this volume the connection of Professor Johnson and the Association of Engineering Societies with the index ceases. The work has been taken up by the publishers of the *Engineering Magazine* as a department of that magazine, the index being published from month to month with the characteristic descriptive notes of the old index, the range of subjects and number of journals indexed being considerably enlarged. These index notes will hereafter be published in annual volumes, continuing the series begun with the two volumes already issued. These annual indexes of technical and engineering literature ought to be an invaluable record.

The index is by subjects. The arrangement of the descriptive notes, while on a whole very good, could be improved upon in some particulars to enable the references to a subject to be found more readily. The alphabetical order and division by subjects are not carried far enough. The more frequent use of cross references would be helpful. If it is desired to find all the articles on any particular subject it is necessary to go over each item under the general subject, as well as any possible branch or division of the subject. Thus the references to engines cover 11 pages, and articles describing one form of compound engine may be on the first of these pages, or the last, or under boilers, or locomotives, or compound locomotives or cylinders.

The heading "Railroads" takes up over 30 pages of the volume and there is no sub-division whatever. Instances of the confusion this causes may be given. Two articles on the "Terminal Problem of Chicago" are indexed, but the items are several pages apart, and there is another article on the same subject under "Chicago." There are notes on elevated railroads under the headings of railroads, elevated railroads and electric railroads. If it is desired to look up electric railroads and electric motors, it is necessary to look through the 30 pages of the index of railroads and also under locomotives, electric motors and motors. Snow plows are indexed under that title, under railroad and street railroads. A series of articles on railroad chemistry which were published monthly for about a year, has three unrelated references, being indexed under chemistry, under railroads and under "railroad information," the rather meaningless title under which they were published. These defects are probably unavoidable in the plan under which the volume was prepared for publication. They do not seriously impair its value, but make it less satisfactory for quick reference, and it must be used with some discrimination; but all indexes are subject to that limitation.

*Blue Book of American Shipping*. Oblong, 6 1/4 x 10 in. Cleveland, O.: *Marine Review*, 1895. Price \$5.

This volume is first of all a directory of the marine interests of the United States and as such will be a useful reference book to all having dealings with vessel interests. The various directories take up nearly 130 pages of the book. The lists and statistics appear to have been compiled with intelligent industry and care.

The book opens with registers of the American and Canadian vessels on the Great Lakes, corrected to May 1, 1896. These show, besides the name and class of each vessel, the keel and beam dimensions, date when built, gross tonnage, and name and address of the owner. No figures are given of either the number or tonnage of the vessels enumerated. This is followed by a list of concerns owning fleets of coasting vessels, but this seems to be incomplete. No mention is made of any of the Long Island Sound lines, the Fall River, Stonington or Norwich routes, nor of the Maine Steamship Co. Mr. H. B. Plant appears as the owner of three steamers, but the Plant Steamship Co., of which he is President, does not appear at all. This, however, may be proper enough. Other lists give the names of the vessel managers of the largest fleets on the Great Lakes (over 900 vessels); the passenger steamer lines, purchasing agents, and sailings, and shipbuilders on the Great Lakes, and on the coast and rivers. Rosters are given of the Lake Carriers' Association, of the Society of Naval Architects and Marine Engineers and other societies whose membership is among vessel men, or men interested in shipping.

In the second part of the book are tables giving particulars of the hull and machinery of lake steamers and barges, and many half-tone illustrations of vessels. There is a brief account of each of the large lake ship-building firms and tables of performances of lake

steamers, cylinder sizes of engines, and a list and short description of vessels built in lake shipyards last winter. The last annual compilation of Lake Superior iron ore production is republished from the *Marine Review*, and there are other important general statistics of lake shipping, lake dock capacities, St. Mary's Falls Canal freight the lake carrying trade and freight charges.

#### Tracklaying in the First Six Months of 1896.

We publish below a detailed statement of railroad building in the United States in the first half of 1896. The tabulation shows the lines on which track was laid and the companies building the new road. The mileage built in each state is also shown, the total being 796 miles.

The preliminary table was published in our issue of June 26 and the additions now made are almost entirely on the lines on which track-laying was then going on, the Lima Northern in Ohio, the Rio Grande Western in Utah, the Manistee & Grand Rapids in Michigan, etc. The most important change made is in the state totals of Arkansas and Louisiana, 77 miles built in the latter state by the Kansas City, Pittsburgh & Gulf having been credited to the former. This was due to the acceptance of a report from the officers of that company giving 77 miles as built in Arkansas, which it now appears should have been reported for Louisiana.

In its last issue the *Railway Age* corrects its own figures of track-laying for the same period, and expresses doubts of the accuracy of those of the *Railroad Gazette*. The criticism is not very important or interesting to our readers, and we do not propose to comment on it. It would be impossible to do so, because the statements are so entirely general; the *Age* publishes no figures other than those of the totals of the states, and until it presents a detailed list of the companies building track there is nothing to say.

#### NORTHERN STATES EAST OF THE MISSISSIPPI.

<b>Maine.</b>	
Rumford Falls & Rangeley Lake—From Summit to Bemis	3
Sebasticon & Moosehead River—An extension north from Hartland.....	9
Total.....	12
<b>Vermont.</b>	
Hardwick & Woodbury—From Hardwick to Burnham Hill.....	3
Total.....	3
<b>New York.</b>	
Seneca County—From Geneva to Waterloo.....	1
Total.....	1
<b>Maryland.</b>	
Queen Anne's—From Queenstown, east to Willoughby..	10
Total.....	10
<b>Delaware.</b>	
Queen Anne's—From Greenwood, west.....	1.5
Total.....	1.5
<b>New Jersey.</b>	
South Jersey—On extension to Ocean City, from Cedar Springs toward Ocean City.....	3.5
Whippany River—From Whippany to Caledonia.....	1.5
Total.....	5.0
<b>Pennsylvania.</b>	
Buffalo & St. Marys—From end of track laid in 1895, near St. Marys, to Clermont.....	23
Lehigh & New England—Between Bender's Junction and Pen Argyl.....	2
Pittsburgh & Eastern—In Clearfield County.....	12
Total.....	37
<b>Ohio.</b>	
Columbus, Hocking Valley & Toledo—On Wellston & Jackson, from near Wellston to Jackson.....	9
Columbus, Lancaster & Wellston—From end of track laid in 1895 near Haynes P. O. to Bloomingville.....	5.25
Lima Northern—End of track laid in 1895 north of Lima, near Leipsic, to Michigan state line.....	45.55
Total.....	59.8
<b>Indiana.</b>	
Chicago, Lake Shore & Eastern—From end of track laid in 1895 toward Clark Junction.....	2.5
<b>Illinois.</b>	
Centralia & Chester—From Centralia west to Salem.....	11.75
Chicago, Hammond & Western—On various branch roads near Chicago.....	10.
Total.....	21.75
<b>Wisconsin.</b>	
Wisconsin Central—On Milwaukee & Lake Winnebago, from Hilbert Junction east to Manitowoc.....	28.27
Total.....	28.27
<b>Michigan.</b>	
Cincinnati & Jackson—Extension of Cincinnati, Jackson & Mackinaw, from Addison Junction north to Jackson.....	18
Lake Superior & Ishpeming—From Presque Isle to Dead River.....	7.5
Manistee & Grand Rapids—From Chicago & West Mich. crossing to a point 3 miles east of Luther.....	13.55
Munising—From Munising Junction to Rock River Road 14.....	14
Total.....	53.05
<b>Minnesota.</b>	
Duluth, Mississippi River & Northern—On branches to mines.....	1.5
Minneapolis & St. Louis—From Winthrop to New Ulm.....	18
Total.....	19.5
<b>SOUTHERN STATES EAST OF THE MISSISSIPPI RIVER.</b>	
<b>Virginia.</b>	
Chesapeake & Western—To complete tracklaying begun in 1895 between Elkton, Harrisonburg and Bridgewater, total (27 miles) of which laid in 1896.....	15
Total.....	15
<b>West Virginia.</b>	
Dobbin & Little Blackwater—Dobbin to Little Blackwater and to Beaver Creek.....	1
Kelly Creek—Timber lands near Mammoth.....	.5
Panther—To timber lands near Panther.....	1
Porter Creek & Gauley River—Along Porter Creek toward Gauley River.....	3.5

West Virginia Southern—From Wooldridge to Perryville.....	2
Total.....	8
<i>North Carolina.</i>	
Aberdeen & West End—From end of track laid in 1895, near Little River to Troy.....	3
Total.....	3
<i>Georgia.</i>	
Abbeville & Waycross—From Lula north to Fitzgerald.....	4.5
Atlantic Lumber Co.'s—From Sparks to Pinopolis.....	4.75
Brunswick & Pensacola—From Folkston to Bullhead Bluff.....	11
Central of Georgia—Fruit branches at Fort Valley, 3.54 miles, and at Marshallville Station, 3.21 miles, a total of.....	6.75
Tifton & Northeastern—From Tifton to Fitzgerald.....	12
Total.....	39
<i>Florida.</i>	
Ellaville, Jennings & Western—End of track laid in 1895 beyond Ellaville.....	4
Florida East Coast Extension—On extension south along Atlantic coast from end of track at Wellsborough River, through Fort Lauderdale, 14 miles; Snake Creek, 27 miles, Lemon City, 34 miles, to Miami, a total of.....	40
Gainesville & Gulf—From Dungenway to Irvine.....	2
Savannah, Florida & Western—On South Florida Division from High Springs to Rileys.....	4
Total.....	50
<i>Alabama.</i>	
Lafayette—From end of track laid in 1895 to Lafayette.....	10
Middle Tennessee & Alabama—From Madison Cross Roads toward Fayetteville, Tenn.....	8
Nashville, Chattanooga & Gulf—End of West Nashville Branch to Cumberland River, one mile, and from Centerville to mouth of Swan River, 4 1/4 miles, a total of.....	5.5
W. T. Smith Lumber Co.—From Chapman, east.....	6
Tallapoosa & Montgomery—From Tallapoosa to Milstead.....	6.5
Total.....	36
<i>Mississippi.</i>	
Chickasaw & Jackson—Extension from end of track into lumber lands.....	2
Gulf & Ship Island—Gulfport north.....	20
Total.....	22
<i>Kentucky.</i>	
Brooksville—From Brooksville to Wellsburg.....	10
Total.....	10
<i>Tennessee.</i>	
Middle Tennessee & Alabama—From Fayetteville, south to Alabama state line.....	15
Total.....	15
<i>Missouri.</i>	
Cassville & Western—From Cassville to Exeter.....	5
Total.....	5
<i>Louisiana.</i>	
New Orleans & Western—On belt line around New Orleans.....	2
Kansas City, Pittsburgh & Gulf—North of Shreveport to Rodessa, 40 miles, and south of Shreveport to Mansfield, 37 miles, a total of.....	77
St. Louis Avoyelles & Southwestern—From end of track, laid in 1895, near Evergreen, east to Simmesport 21 miles; and from main line north to Marksville 10 miles, a total of.....	31
Total.....	110
<i>Arkansas.</i>	
Southwestern Arkansas & Indian Territory—From Antoinette, west on line to Pike City.....	2.25
Total.....	2.25
<i>Indian Territory.</i>	
Kansas City, Pittsburgh & Gulf—On main line south of Siloam Springs, to Arkansas state line.....	41
Total.....	41
<i>Oklahoma.</i>	
St. Louis, Oklahoma & Texas Air Line—From Tecumseh to C. O. & G. R. R. Junction.....	5
Total.....	5
<i>Texas.</i>	
Timpson & Carthage—End of track laid in 1895 to Carthage.....	5
Kansas City, Pittsburgh & Gulf—Between Beaumont and Port Arthur.....	20
Gulf & Interstate (of Texas)—To complete tracklaying begun in 1895, between Beaumont and Port Bolivar, opposite Galveston (total 70 miles), built in 1896.....	13.5
Aranas Pass Terminal—From City of Aransas Pass north to Corpus Christi Channel.....	3.2
Total.....	41.7
<i>Colorado.</i>	
Rio Grande & Pagosa Springs—From Edith to Chromo.....	6
Silverton Northern—Silverton north to Eureka.....	6
Total.....	12
<i>Utah.</i>	
Salt Lake & Hot Springs—From Farmington to station.....	41
Rio Grande Western—On Sevier Branch—From Salina south to Richfield, 18 miles to Elsinore, a total of.....	25
Total.....	25.41
<i>PACIFIC COAST STATES.</i>	
<i>California.</i>	
Alameda & San Joaquin Valley—From San Joaquin River to end of track at terminus, near coal mines.....	18
San Francisco & San Joaquin Valley—From Stanislaus River south to Mariposa Creek.....	55
Southern Pacific—From Guadalupe to Santa Ynez River, 23.38 miles; Corina to Pomona, 7.84 miles, and Monrovia to Duarte, 2.44 miles, a total of.....	33.66
Total.....	106.66
<i>Washington.</i>	
Peninsula—Extensions of logging branches in Mason County.....	4
Total.....	4
Total, United States.....	796.39

## Blind Tires for Locomotives.

Continued from page 523.

nor's having much trouble with sharp flanges on forward drivers, when their mogul engines had the center drivers blank, and their consolidated engines had the two center pairs of drivers blank. They frequently turned down at the tire set of wheels from 3/4 to 1/2 of an inch in thickness to procure safe forward flanges. All trouble from

sharp flanges gradually disappeared when they commenced leaving flanges on blank drivers, as engines came into the shop for tire-turning. They now have full flanges on drivers originally blank, obtained from successive turnings, and report excellent results.

*Fifth.* First cost less: Engine tires are sold by the pound, the price being the same for flanged or blank ones. As blank tires are usually ordered from an inch to an inch and a half wider than flanged tires, they weigh more, and consequently cost more.

*Sixth.* Smaller stock of duplicate parts. *Seventh.* More tractive power: All tires wear hollow on that portion of the tread which travels on the head of the rail on a tangent. This hollow increases until 1 1/2 in. deep, when tires are turned. Now, if one of the advantages of blank drivers (easier on curves) is experienced in practice, this hollow will be partly shifted to one side of the head of the rail in passing over curves; and the blank drivers will rest on one of these ridges on either side of the hollow, in which position it does not have a full bearing on the head of the rail, and is much more liable to slip than if it had a full bearing, causing loss of power at the very time when additional power is needed. With flanged tires, the wheel is kept in position so that each driver has a full bearing on head of rail, and the weight of the engine is more equally divided between each rail.

Mr. LEWIS (Delaware, Lackawanna & Western): I have not had a blind tire or plain tire on the road since 1872, and I do not think there is one on the Delaware, Lackawanna & Western system. We never found any inconvenience from wear or cutting of flanges, or de-flanged tire. . . . Now we turn flanges back just as far as the tread is worn and we never take an engine in for turning tires on account of sharp flanges. One of our most reliable engineers said to me within 30 days that formerly, when running our engines with bald tires, he had often gone out to the front of the engine and held the oil-can over the wheel flange where the fire was flying out of the pony truck wheels. We run these engines now on the fastest milk trains and do not have to use an oil can.

Mr. MITCHELL (Erie): Our practice on consolidation locomotives is to flange the forward drivers and the rear drivers, leaving the second and third pair plain. We use 5 1/2 in. tire for the forward and rear tires and 6 1/2 in. for the plain. On a sharp curve we have had an engine leave the track, but we very rarely have an engine leave the track on main line and these engines are running as high as 50 miles an hour. We have 10-wheelers making as high as 70 miles an hour in places, with the middle pair of wheels plain. We did have a few with a rigid truck with the front pair plain; but we have changed such engines and applied a swing-motion truck, and made the middle pair of drivers plain in order to get an easier-riding engine.

struction of the railroad. I have never heard any complaints of it, and I believe it is the right system. . . . But we turn all our tires straight. We do not cone them with that class of engine, and we leave the leading pair about a quarter of an inch slack to the gage, second pair 1/8 in., third pair 1/4 in., and rear pair to gage, which is 4 ft. 8 1/2 in. And then our six-wheel switch-engine drivers are all flanged. We leave the main driver up to gage, and the forward and back pair about 1/8 in. slack to the gage, so that they will go around curves readily. We do not have any trouble with cut flanges; but the tires are turned straight. Even on the wheels under the tender the tires are not coned. . . .

Mr. MEDWAY (Fitchburg): Fifteen years ago I became impressed with the uselessness of blind tires on moguls and consolidation engines. A test was made at the time with two consolidation engines. One was equipped with all flanges; the other had the second and third pair blind. They were tried over a sharp curve. The engine with all the drivers flanged passed over without any difficulty whatever. Not so, however, with the one with the bald tires. As soon as the bald tires struck the sharp point of the curve they left the rail. Some time afterward I arranged three consolidation engines with all flanges, and the results were highly satisfactory. For the past two years we have not put on any bald tires at all and we are more than satisfied with the results. It is a well-known fact that with mogul engines and consolidation engines using bald tires there is a tendency to cutting of the flanges. Now I have not found it so with engines with all flanges. The wear seems to be fairly in the center of the tread. . . .

Mr. BLACKALL (Delaware & Hudson Canal Co.): We flange all wheels on our engines. We have three consolidation engines running out of Binghamton and we have no trouble with them going around curves; while the Erie have three or four in their yard—with the second and third pairs, I think, blank—that cannot go in our yard and turn around our curves. . . .

Mr. WEST (New York, Ontario & Western): I am a thorough convert to flanges on all wheels. The best proof I can give you, gentlemen, of the advantage of all flanges is to refer to a runaway on one of our mountain roads within the past few weeks, where 31 out of 34 cars went down the bank. The engine was a consolidation, with flanges on all the wheels, and the third car from the engine was the one that left the track. Some who are advocates of bald tires said that the engine spread the rails. But it is evident that this could not have been the cause, for the reason that the three cars next to the engine remained on the rails. They were running just as fast as they could down an 80-ft. grade and the engine had tilted on either side so far that she had knocked off the pedestal braces on both sides, and that is one of the best proofs I can give you of the safety of I do not believe that an engineer will make better time with a locomotive with all tires flanged than he would with the middle pair plain, as stated by the gentleman who read the paper. I consider our engines perfectly

safe to make any speed, provided the driving wheels are the proper diameter for the speed. Speaking about eight-wheel engines, I was talking with a superintendent of motive power to-day in my office, and he stated that all their eight-wheel engines had the forward drivers plain. Those engines were run on their fast trains. They use a rigid truck, and a 7 1/4-in. tire in width on the main wheel, and are getting exceedingly good results from that practice. The gentleman who read the paper also stated that the term "driving-wheel base" was used in place of "rigid wheel base" on account of the axles not remaining parallel. I wish to take exception to that remark. I do not believe that any of us are running locomotives with the axles out of parallel. If we are, I think we had better stop the engines as soon as possible. I do not fully agree with the previous speakers on the sharp flanges being formed by using plain tires on the engines. We make a large mileage without having sharp flanges. An engine must be shopped when the tires are worn 1/4 in. with us, and we have a great many engines shopped that do not have sharp flanges—engines of the consolidation and 10-wheel types. Again, I do not agree that the tractive power is greater with all the drivers flanged than where they are not. The wear of the tire is gradual. The space of the tires worn by the rail is not exactly the size of the rail, and, therefore, a locomotive running on a curve will surely have a good solid bearing with each wheel on that rail. The tractive power must be therefore the same. I am open to conviction, I will say candidly, on the question of putting more flanges on our wheels. It is under discussion with us, and we have not yet decided whether to add more flanges or not. I am of the opinion, however, that we will get better results if we put flanges on three wheels (and possibly on all four) of the consolidation engines.

Mr. SAGUE (Schenectady Locomotive Works): Our general practice is to put on blind tires on the middle connections of 10-wheel and mogul engines and blind tires on the second and third pairs of drivers of consolidation and 12-wheel engines; but, of course, in regard to the arrangement of tires on all engines that we build, the superintendents of motive power of the different railroads include the tires almost invariably in their specifications, and my statement would only indicate the prevailing practice of the superintendents of motive power on that subject. We are not convinced as to which is the better practice to recommend. For our own part, though, we are gradually coming to the idea that the more flanges you have the better, and the experiences we have heard from the engines built by us for the Fitchburg Railroad and also for the Delaware & Hudson Canal Company have had a good deal to do with the forming of that opinion. There is one thing I can say quite conclusively, and that is—we have made up our minds that it is a good deal better plan to have the blind tires for the 10-wheel engines on the middle rather than on the forward drivers. I think we may be a little undecided as to whether blind tires should be used, and we are thoroughly decided that if they are used on the 10-wheel engines they should be on the middle rather than on the forward wheels. We feel as if it is safer to have three flanges at the head of the engine than two; and we feel also, from observation on different railroads, that the blind tire is a prolific source of hub wear. I have found in practice on the railroad, and also since being in the locomotive works, that engines having blind tires on the forward pair are more apt to have hub wear on the forward truck, and also on the flanged drivers, and I think the reason is quite clear. Take it on straight track: If all the wheels are flanged, and a reasonable amount of lateral motion allowed, the flanges keep the wheels in line while if one pair of tires is blind, the only thing which keeps those tires on the track is the pressure due to the driving boxes. There are no flanges; consequently, the driving boxes have to maintain those wheels in alignment. We notice, in the case of a ten-wheel engine with rigid center truck, that the rigid wheel base is from the center of the forward truck to the back pair of driving wheels, being more properly that dimension than the driving-wheel base, as generally stated, and consequently; we think, by putting on a swing center forward truck and giving them a flanged pair of driving wheels forward, that we shorten up the rigid wheel base rather than lengthen it.

Mr. WEST (New York, Ontario & Western): Mr. Sague's remarks suggest one point referred to by Mr. Mitchell. You will find in the case of bald tires that they will be worn an inch and a half off the center of the tread while you never find this on flanged wheels. I know when we commenced using bald tires we soon found them worn an inch and a half off the center. Now, that must necessarily be harder on the track than where the wear is even, and I think the same experience would be true of every road. You find the rail has worn into the bald tire off the center and you seldom see that on flanged wheels.

Mr. MENDENHALL: The practice of the Pennsylvania Railroad Company is to use blind tires on the second and third pairs of drivers on their consolidation locomotives, and the best evidence that that practice is thoroughly believed in is the fact that all of these engines are so equipped and that there are a great number of them.

Mr. DONNELLY (Lehigh Valley): I do not know that I am competent to discuss the matter except from the operating standpoint, but from that point of view I am in favor of all wheels under locomotives being flanged. While I have had experience with both, and we have never had a derailment on the main line that could be attrib-

uted to a bald tire, we have had them in the yards. . . . From a maintenance of way point of view, I don't believe there is any data to tell what is most desirable. On a road which uses all flanged tires they get no data about flat tires, and on roads where both are in use they can not tell which damages the track the most. Our practice is to widen the gage of very short curves about  $\frac{1}{8}$  in. to enable long coupled engines to go around.

Mr. MITCHELL (Erie): Mr. Donnelly says they widen their gage a  $\frac{1}{8}$  in. on curves, if I remember rightly; and also said that on 20-deg. curves, with 16 ft. rigid base, it was necessary to widen the gage  $1\frac{1}{2}$  in. in order to get the engine around.

Mr. MOLINEUX: I think Mr. Donnelly stated on light curves; that is, if you allowed nothing for the play of the engine. I have a letter here from the Roadmaster of a system with over 1,300 miles of track and over 700 locomotives, in which he says: "As far as my experience now goes, engines with three pairs of driving wheels all flanged are not any harder laterally on our track than if one pair was blank. Derailments of this class of engines have occurred where one of the wheels (either the front or middle one) was blank. As I now look at this question, I see no objection to having all the driving wheels of engines of this class flanged, and they are not injurious to the track, when so arranged, when run on curves having a radius of not less than 300 ft."

Mr. STEWART (West Shore): In regard to the question of traction an instance occurred on the west end of our road not long ago. Our limited train lost time between Rochester and Chili Junction, where we run over the New York Central tracks, the engine slipping all the way, and they could not account for it. The next day they made an investigation to see what the trouble was. They found the engine tires worn very nearly  $\frac{1}{8}$  in. The New York Central had put down their 90-lb. rail with wide head the day before, and the rail being wider than the worn space in the tires, the latter were riding only on the outside edge of the rail. It seems to me that illustrates some of the ideas brought out here to-night.

#### Sellers' Restarting Injector.

We present herewith a cut giving a sectional view of the new automatic restarting injector which has lately been brought out by Wm. Sellers & Co., Philadelphia. This injector was designed for use on stationary and portable boilers, traction and hoisting engines, tug boats, etc. The system of manufacture is such that the pipe sizes and proportions having once been determined, they are maintained by having parts made to a certain system of gages, making them interchangeable; and, although this injector may have been in service until badly worn, a new tube or part can be furnished that will fit perfectly and give the same results as the original. This injector is automatic in every respect and has been designed with a view of having as few parts as possible. There are no levers; no fittings except ordinary globe valves are required; it is very easily repaired, only a screw driver and a monkey wrench being required to take it apart when necessary to clean or renew parts. In designing, particular care was exercised to obtain a wide range, to enable it to work hot water and to get the maximum lift. It will be noticed that there is no valve or other obstruction in the overflow, so that when the injector is out of service, if the steam supply valve should leak, there is no danger of heating the water in the service pipe to a very high temperature.

Its action is as follows: Steam enters at the top, and passing down through the steam nozzle, 3, discharges through the draft tube into the overflow chamber, and thence to the air, lifting the water to the injector. The partial vacuum caused by the condensation of the steam within the combining tube raises the bushing, 5, up against the draft tube, and holds the lower bushing, 6, against the delivery tube, thus preventing the admission of air.

The Jenkins Brothers, of New York, have been appointed the selling agents.

#### TECHNICAL.

##### Manufacturing and Business.

The Blackmer & Post Pipe Company has, as a result of its long experience, adopted the following specifications for standard 36-in. culvert pipe: Net diameter, 36 in.; net length, 2 ft. 6 in.; thickness,  $2\frac{1}{2}$  in.; depth of socket, 5 in.; net weight, 925 lbs., or 370 lbs. per ft. The company also makes smaller sizes with proportionate specifications. It has just received an order from the Atchison, Topeka & Santa Fe road for 210 ft. of the standard size.

The Schwartz Foundry Co., Limited, has been incorporated in New Orleans, with a capital stock of \$2,000,000. The directors are Moses Schwartz, William Adler, Michael G. Weil, Sidney Bradford and Alfred Jordet.

During June 170 sets of Leach's pneumatic track sanding apparatus were shipped by the manufacturer, 119 sets of these going to locomotive builders, as follows: To Baldwin Locomotive Works, 25 for the Lehigh Valley; to Pittsburgh Locomotive Works, 22 for the Vandalia road and 12 for the Seaboard Air line; to Schenectady Locomotive Works, five for the Southern Pacific, 10 for the New York, New Haven & Hartford and two for the Fitchburg; to Cooke Locomotive Co., five for the Southern Pacific and 10 for the Baltimore & Ohio; to the Richmond Locomotive Works, 25 for the Baltimore & Ohio; to the Brooks Locomotive Works, three for the Burlington, Cedar Rapids & Northern. Among the shipments

for old engines were 30 for the Norfolk & Western and 12 for the Southern Railway.

Judge Simonton, of the State Court at Harrisburg, Pa., has appointed Arthur King Receiver for the Middletown (Pa.) Car Works. Mr. King is the principal owner of the concern. In the bill of complaint filed by creditors it was stated that there are claims against the works of \$57,675, and that the value of the plant and material on hand is about \$118,000, with a considerable number of orders on hand. It was agreed by all parties interested that the business should proceed under a receivership. About 200 hands are at present employed at the works.

The Rhode Island Locomotive Works was closed on Monday of this week pending plans for the reorganization of the company. It is stated that under the plan now being discussed new working capital will be subscribed in New York and Providence, R. I. In February last the creditors gave a five-year extension of the company's notes and the shops have since been running under the arrangement then made.

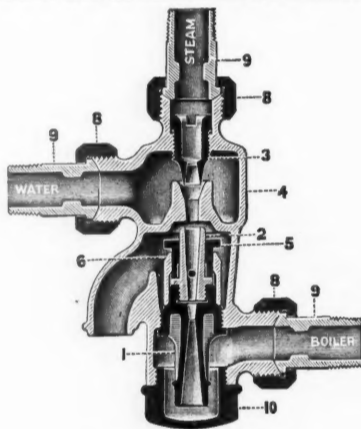
Mr. F. M. Pease, dealer in railroad supplies at 3 Dearborn street, Chicago, has recently taken the agency for the Wilmington Malleable Iron Co., makers of "Little Delaware Couplers." Among recent sales of cars made by Mr. Pease he reports the entire new standard gage equipment of the San Pete Valley road in Utah.

#### Iron and Steel.

The Carnegie Steel Company is filling two orders of 5,000 tons each, for structural material for use in buildings in San Francisco. Other contracts are for 40 bridges for the Coahuilla Development Co., Mexico, and 30 narrow-gage bridges on the island of Port-au-Prince.

At the works of the Pennsylvania Steel Co., Steelton, Pa., the iron and steel foundries are crowded with orders. The bridge construction and machine department have many orders ahead, and the frog, switch and signal department is running with day and night turns.

At the annual meeting of the Pittsburgh Wire Company, on July 8, a dividend of 6 per cent. was declared. The company proposes to erect several new departments, and the works will soon resume operations, employing 700 men. President Alexander Dempster has resigned and Willis F. McCook has been elected to succeed him.



Sellers' Restarting Injector.

In response to the call made by George Brooke, Chairman of the Eastern Pig Iron Producers' Association, a meeting of pig-iron makers was held on July 15, in Philadelphia.

The Schuylkill and Lehigh Valley districts and New Jersey were well represented, and the Southern manufacturers responded by letter, expressing approval of the objects of the meeting. The manufacturers of the Shenandoah and Mahoning Valleys refused to join in any pool with the Eastern producers. After a long discussion, it was decided that the only sure method of improving the situation would be to curtail production, but at that point the real difficulty of the situation became apparent. Curtailment, to be effective, must be heavy, and to be equitable it must be fairly apportioned. After a three hours' session the meeting adjourned, having practically accomplished nothing. A scheme for reducing the output will be submitted by letter or circular to the various companies, but until these are heard from the situation will remain unchanged.

No. 2 furnace of the Bellaire Steel Company, Bellaire O., was blown in on July 6, after an idleness of five months. No. 1 furnace will remain idle. The Bellaire Company has signed the Amalgamated Association steel scale.

The following companies have signed the scale of the Amalgamated Association: The La Belle Iron Works, Wheeling, W. Va.; the Ellwood Tin Plate Company, Ellwood City, Pa.; the New Castle Steel & Tin Plate Company, New Castle, Pa., and the Illinois Steel Company.

A meeting of the stockholders of the Saltsburg (Pa.) Rolling Mill Co. was held recently, and the following officers elected: President, S. M. Jackson; Treasurer, S. M. Nelson; Secretary, D. U. Remaley. The directors include the above named, with John H. Jackson and W. B. Walker.

#### New Stations and Shops.

The Chicago, Rock Island & Pacific is building a new passenger station at La Salle, Ind., and will elevate its

tracks about 3 ft. above the present grade to reach the new station. A new freight house will also be built.

Contracts have been let for a new station at One Hundred and Twenty-fifth street, New York City, for the New York Central & Hudson River Railroad, to be completed in about three months. The station will be under the elevated tracks of the road. Its plans require the lowering of one section of the steel viaduct 8 in. Practically all of the trains of the road, except the Empire State express, will stop at the new station.

W. L. Ziegler, Engineer of Construction of the Pennsylvania road, is receiving bids for the building of the new passenger station to be erected at Germantown Junction, Pa. It will be of stone, two stories in height, and will measure  $103\frac{1}{2} \times 53\frac{1}{2}$  ft. The interior finish will be in classic style, and a wainscoting of Tennessee marble about 6 ft. high will extend around the walls. The floors will be of marble tile. On the main floor will be two waiting rooms, one for the exclusive use of ladies, ticket office, etc. A covered passageway will lead from the trolley waiting room to the station. Electric heating and lighting will be used. The plans were prepared by Architect T. P. Chandler, under the supervision of Chief Engineer W. H. Brown, of the railroad company.

The officers of the Seaboard Air Line have informed the city officers of Raleigh, N. C., that the machine shops at that place, destroyed by fire several months ago, will not be rebuilt at Raleigh or any other point at present.

The Baltimore & Ohio has adopted plans for a new brick passenger station and office building at Clarksburg, W. Va., and it will be erected this fall. It will be used by the Baltimore & Ohio, Monongahela River and West Virginia & Pittsburgh roads.

#### Pig Iron Production for the First Half of 1896.

Statistics of the production of pig iron in the first half of 1896 have been collected by the American Iron and Steel Association, and were published in *The Bulletin* for that association on July 20. The total production of pig iron for the six months is given as 4,976,236 gross tons, being 888,678 tons more than the production for the first half of 1895. This total was made up as regards fuel used, as follows: Bituminous coal and coke pig iron, 4,155,528 tons; anthracite, and mixed anthracite and coke pig iron, 684,011 tons, and charcoal pig iron, 136,697 tons. These figures include spiegeleisen, the total production of which amounted to 83,010 tons. In this total output of pig iron Pennsylvania leads with 2,246,753 tons, and Ohio is second with 743,444 tons.

On June 30, 1896, the total unsold stocks of pig iron covered 644,887 gross tons as against 439,290 gross tons on June 30, 1895. Pennsylvania holds 243,800 tons of this amount, and Ohio 113,111 tons; 390,883 tons are from bituminous coal.

For the last four years the total production of pig iron is given as: 9,157,000 tons in 1892, 7,124,502 tons in 1893, 6,657,388 tons in 1894, and 9,446,308 tons in 1895.

#### The Reading Subway.

On July 15 the contract for laying temporary tracks in connection with the building of the subway in Philadelphia for the Philadelphia & Reading tracks was awarded to P. McManus & Co. The tracks will be laid on Hamilton street, Philadelphia, so as to leave Pennsylvania avenue free for the building of the subway. The contractors have agreed to have the track-laying completed in three months. It is probable that all contracts for the work, except that for shortening the tunnel, will be awarded within a few days.

#### Philadelphia's First Iron Pier.

A new iron pier, the first of the kind ever built in Philadelphia, now in course of construction on the Delaware River front, between South and Bainbridge streets, is almost completed. The new pier, which is to be used for discharging sugar, will have facilities for the rapid handling of cargoes, and is of sufficient length and width to permit of the unloading of four large vessels at the same time. The pier is 540 ft. long  $\times$  75 ft. wide.

#### THE SCRAP HEAP.

##### Notes.

Conductor Reed and Engineer Montgomery, of the excursion train which was wrecked near Logan, Ia., July 11, have been declared by a coroner's jury responsible for the collision and warrants were issued for their arrest.

The Grand Trunk Railway has begun preliminary operations looking to the construction of its proposed new grain elevator at Portland, Me. The building is to be 150 ft.  $\times$  90 ft., and 165 ft. high. Its capacity will be about 1,500,000 bu.

The barns of the Chicago City Railway at Cottage Grove avenue and Thirty-ninth street, Chicago, were burned on July 18, together with 554 street cars. Loss \$500,000. Seven men were injured in the fire and 14 horses were burned up.

It is reported that the parties who have for two or three years operated a  $6\frac{1}{2}$ -in. pneumatic tube between the General Post Office in Philadelphia and the Stock Exchange, about one half mile distant, are to lay down a number of other tubes in that city.

The Railroad Commissioners of Massachusetts have issued a notice stating that the Martha's Vineyard Railroad is not in condition to warrant the Commissioners in authorizing the running of trains, and that if trains are run it is without the permission of the Board.

Near Blair, Neb., last week, a mixed train of the Chicago, St. Paul, Minneapolis & Omaha was captured by a gang of 100 tramps, and the conductor had to leave part of his train on the main track and run with his passengers to the nearest city for help. Freight trains in that region are daily boarded by gangs of 20 to 50 tramps. New Jersey papers report that the detectives of the Pennsylvania road are making vigorous raids on the tramps between Jersey City and Trenton. One day last week 12 were lodged in prison for two months each, but the next day eight who were brought before a justice in Newark were discharged. The reporter states that upon almost every freight train passing through Newark 20 to 50 free riders can be counted.

#### Lake Notes.

The whaleback steel ship John Ericsson, for the Bessemer Steamship Co., was launched at Superior on July 11. The vessel is 404 ft. long, and is expected to carry 7,000 gross tons on 19 ft. of water. She has triple expansion engines, and is calculated to travel, with a loaded consort, 11 miles an hour, with very small coal consumption. The consort, Alexander Holley, 376 ft. long, will be launched on July 25.

During the past fiscal year there was an increase of 500 per cent. in the tonnage enrolled at Duluth, the increase in number of vessels being from 58 to 80, and in the tonnage from 5,485 to 20,593. About 50,000 more tons of shipping will be added this calendar year.

The Queen City, owned in Duluth, and just completed in Cleveland, has taken as her first cargo 151,000 bushels of wheat, or 4,576 net tons. This would equal the product of 15,000 acres of wheat land, and would load 252 cars. It is the largest cargo ever carried on the lakes at that draught of water.

In June the two Sault canals passed 2,690,587 tons of freight, or 209,600 tons more than in any month before in their history. Almost 5,500,000 tons have passed this season so far. In June nearly 1,600,000 tons of iron ore, almost 8,000,000 bushels of grain and 500,000 tons of coal were passed. The vessels numbered 3,210 and their registered tonnage was 2,898,567.

Over 2,600,000 gross tons of iron ore has passed out of Lake Superior, and 1,100,000 tons from Lake Michigan this season. All districts but those of Minnesota have greatly reduced their output because of dullness in the market.

The American Steel Barge Co. will build two steel vessels, larger than anything now on the lakes, during the coming winter, also a second dry dock, 550 ft. long.

Coal shipments up the lakes, largely to Chicago, are the largest on record, being at a rate of 3,500,000 tons for the season.

#### The New York Canals.

The work of improving and deepening the Oswego canal will probably be begun in a few weeks. The field work of the surveyors is completed and the estimates are now being made. The canal will be made nine ft. deep over all aqueducts and sills. Many of the locks will be repaired and in some cases will be replaced by new steel lift locks. The locks will be made to accommodate boats 10 ft. longer than are now able to pass.

#### New Mileage in North Carolina.

The North Carolina Railroad Commission reports the new mileage put in operation from July 1, 1895, to July 1, 1896, in the state as follows: Hendersonville & Brevard, from Brevard Transylvania County, to Hendersonville, from Henderson County, where connection is made with the Western North Carolina road (Southern system), an entirely new road, 22 miles; Caldwell & Northern, from Lenoir to Collettsville, 12 miles; Aberdeen & West End, extension, 11 miles; Ellenborough & Henrietta, extension (to the two new cotton mills at Henrietta) of the S. A. L. principal owners, 7 miles, a total of 52 miles. This makes the mileage in the state 3,429. To this is to be added the number of miles of sidings, etc.—279 miles. Total number of miles of track in state, 3,708. Divided as follows: Southern system, 1,002 miles; Atlantic Coast Line, 687 miles; Seaboard Air Line, 614 miles; other roads, 1,129.

#### Trac ion Engines in England.

The Locomotives on Highways bill has passed its second reading, and has been referred to the Standing Committee on Law, and there is a chance, that we shall see the bill become law during the course of the present session. The bill does not seem to have been quite so "uncontentious" in its character as has been generally believed. Some honorable members discovered during the course of the debate sentiments toward mechanical traction which give one a forcible reminder of the attitude of country bucolics toward the introduction of the railway system. An honorable member opined that horseless carriages would "cut up" the roads, and subject rural ratepayers to ruinous expenses in repairing the ravages made on public highways by these ill omended conveyances. Another honorable member deplored the introduction of auto-motiles on the ground that they would depreciate the breed of horses, an argument which we think we have heard before in another form. As Mr Chaplin forcibly pointed out, however, the Government must either pass this bill or virtually penalize and retard a new and most promising industry. On this the dissentient voices died away.—*Industries and Iron.*

#### Railroad Projects in Guatemala.

The Guatemala Government has granted a concession for the construction of a railroad from Ocos to the village of Santa Catalina and the port of Nahuatan. Work will be commenced within 14 months, and the roads must be completed within three years. The contractors will receive a subvention of \$15,000 a mile of road constructed.

#### LOCOMOTIVE BUILDING.

The large locomotive orders of the Baldwin Locomotive Works for Russian roads have recently been completed, 60 engines and 50 tenders having been shipped during the last two or three weeks from Philadelphia. The works are busier than they were at this time last year, the work in progress including 25 locomotives for the Lehigh Valley, 20 for the Baltimore & Ohio and five for the Erie road.

The current reports that the Lake Shore & Michigan Southern is to shortly make large expenditures for new equipment have little foundation. It is possible that the company may shortly purchase a few new engines, but nothing definite has yet been decided. We are informed by an officer of the company that it is not proposed to build any new cars beyond 1,000 box cars contracted for five months ago.

An oil-burning locomotive has just been completed at the Brooks Locomotive Works, Dunkirk, N. Y., for the Congress Gold Company, of Congress, Ariz. The locomotive is a 6-wheel switcher with 17 in. x 24 in. cylinders, weighing 105,000 lbs. It is now being tested by Mr. George W. Prescott, who devised the parts pertaining to the use of oil fuel. Mr. Prescott was formerly Superintendent of the machinery car department of the Southern California.

#### CAR BUILDING.

The Hoosac Tunnel & Wilmington has just built twelve 40-ft. platform cars at its shops at Readsboro, Vt.

The Lebanon Mfg. Co. is working on an order for 500 gondola coal cars for the Philadelphia & Reading, which will keep the works busy for some months.

At the Northern Pacific car shops at South Tacoma, Wash., the capacity of a large number of box cars is being increased from 40,000 to 50,000 lbs. It is estimated that fully 5,300 cars will be so reinforced. The enlargement of capacity is made by strengthening the arches and body bolsters. The arches are recapped on the trucks and a strong webbing is put in the body bolsters. The company is also beginning the construction of 120 flat cars.

#### BRIDGE BUILDING.

Bayard, W. Va.—It is proposed to build a 90-ft. single-span iron-truss bridge on stone foundations at this place at an estimated cost, it is said, of \$1,200.

Bridgeport, O.—The Belmont County Commissioners and the Cleveland, Lorain & Wheeling Railroad Co. have agreed upon plans for a wagon and foot-way bridge over Wheeling Creek and the yards and tracks of the railroad. The tracks will be crossed by a separate viaduct about 100 ft. long. The bridge proper over the creek will be about 300 ft. long. The expense will be divided by the county and the railroad.

Carlisle, Pa.—The Commissioners of Cumberland and York counties have conferred on the proposed joint erection of a bridge over Yellow Breeches Creek.

Conquest, N. Y.—The contract for two iron bridges across the Seneca River, to connect this town and Mentz, has been let to the Owego Bridge Co. at \$1,940.

Dereham, Ont.—A new iron bridge will be built between this place and Malahide.

Green Bay, Wis.—Bids for a bridge across Devil River were received July 8, as follows: Bookmans & Dirks, Green Bay, \$1,319; Carners & Say, De Pere, \$1,296; Arnold Van Gemeset, De Pere, \$1,348; T. W. Gormans, Rockland, \$1,149; Greiling Bros., Green Bay, \$1,950; Milwaukee Bridge and Iron Works, Milwaukee, \$1,470; Wisconsin Iron Bridge Co., Milwaukee, \$1,575. T. W. Gormans received the contract at his bid.

Helena, Mont.—Bids for a bridge over Beaverhead River, for the new Argenta road, were received as follows: Hopkins & Houk, \$875; Estes & Swanstrum, \$876; F. W. Vreeland, \$895. The contract was awarded to Estes & Swanstrum.

Little Rock, Ark.—Bids for the free bridge across the Arkansas River at Main street, this city, were received by W. A. Compton, J. A. Woodson and W. W. Dickinson, as follows: Pulaski Bridge Co. for the Missouri Valley Bridge Co., three bids; first, \$350,000; second, \$375,000; third, \$390,000. Groton Bridge & Manufacturing Co., three bids; first, \$353,022; second, \$372,322; third, \$393,400. King Bridge Co., one bid; \$400,000. The bid of the Youngstown Bridge Co. was not considered, so the report says as it was not in accordance with the advertisement. The Commission will report to the County Court on July 25.

McAdamsville, N. C.—The Commissioners of Gaston County are receiving bids for a 350-ft. iron bridge across the South Fork of the Catawaba River near this place. Address Chairman Board County Commissioners, Gaston County, Gastonia, N. C.

McKeesport, Pa.—The Versailles Traction Co. has decided to build a new iron bridge across Long Run below the present township bridge. It will be built wide enough for double tracks, and will be so built as to do away with the present bend in the road.

Milltown, Me.—It is reported that the old wooden bridge on the Canadian Pacific, at the Salmon Falls, will be replaced by an iron one.

Montreal, Que.—Henry Holzgate, Manager of the Park and Island Railway Co., is receiving tenders for an iron bridge over the River des Prairies at Sault-aux-Recollets.

H. S. Holt, A. A. Thibaudan, W. Strachan, A. Brunet and F. L. Beique, of Montreal, have formed a company and will apply to the Dominion Parliament for a charter as the "Montreal Construction Co. (Limited)," to build railroads, bridges, etc.; capital \$500,000.

New Bedford, Mass.—The County Commissioners opened bids July 15 for the construction of a new 70-ft. bridge across the Acushnet River, between New Bedford and Fairhaven. There were 13 bidders, the Wrought Iron Bridge Co., of Canton, O., submitting the lowest figures. The contract will be awarded after the supervising engineer has examined the figures.

Niagara Falls, N. Y.—The taxpayers of the city have voted to raise \$15,000 for the purpose of building a bridge over the Erie tracks at Pierce avenue.

Painesville, O.—Bids were received as follows for the superstructure of the bridge over the Grand River at Main street:

Champion Bridge Co., Wilmington, O., \$31,500; Fort Pitt Bridge Co., Pittsburgh, Pa., \$29,750; Groton (N. Y.) Bridge and Mfg. Co., \$26,600; King Bridge Co., Cleveland, O., \$15,000 to \$42,500; Massillon (O.) Bridge Co., \$23,500; Youngstown (O.) Bridge Co., \$13,600 to \$23,600.

Phoenixville, Pa.—John Denithorne & Son, of this city, have been given the contract for a new iron 70-ft. span county bridge over Mill Creek, at Chadwick's Crossing, in Lower Merion Township.

Pulaski, Mich.—The contract will soon be let for a new bridge over the Kalamazoo River, west of this place.

Quebec, Ont.—City Engineer Baillaye has prepared plans for the bridges over the St. Charles River, to connect Parent Park with St. Roch and St. Sauveur, and the consent of the government is now waited for.

Rankin, Pa.—The Council has decided to build a bridge over the Baltimore & Ohio, at Keating, from Hawkins avenue to Braddock avenue.

Rochester, N. Y.—City Engineer Fisher has received copies of the plans, prepared by the State Engineering Department, for the proposed new hydraulic lift bridge over the canal at Exchange street. If the plans are approved by the city authorities, it is expected that the state will build the bridge after navigation closes.

St. Charles, Mo.—Contracts for iron bridges throughout St. Charles County have been let by County Surveyor Edwards, as follows: Massillon (O.) Bridge Co., a 24-ft. span, in Weldon Springs, at \$206; St. Louis Bridge and Iron Co., a 36-ft. span, at \$690; two 20-ft. spans at \$302 each; Stupp Bros. Bridge and Iron Co., St. Louis, a 42-ft. span at \$514; a 39-ft. span at \$400; a 36-ft. span at \$459; a 32-ft. span at \$251; two 30-ft. spans at \$357 each; a 20-ft. span at \$204.

South Paris, Me.—At a special town meeting \$1,000 was raised for the new-covered bridge across the Little Androscoggin on the Paris Hill road.

Springwells, Mich.—Report says that Highway Commissioner Knoch has advertised for bids for a new bridge about 80 ft. long and 16 ft. wide to be built over Ronlo Creek, on the Maple road.

Spruce Head, Me.—The Wrought Iron Bridge Co., Canton, O., has contracted to build a bridge at this place. The sub-structure will be of stone and the super-structure of steel. The bridge will have six spans, each 52 ft. long, with a 14-ft. roadway. The total cost of the bridge will be \$4,200.

Toledo, O.—The Wheeling & Lake Erie will build a new steel bridge across the Maumee, on Summit avenue. It is the idea to make it a combination bridge—for the railroad and general travel. A proposition will be made to the County Commissioners asking their assistance in the matter.

Victoria, B. C.—The City Council has decided to build a bridge across the Victoria Arm at Point Ellice, and has appropriated the necessary amount for the purpose.

West Chester, Pa.—The County Commissioners will soon let a contract for the erection of a county bridge over Pine Run, near Anselma.

Woonsocket, R. I.—The committee on streets and bridges considered three plans for a new bridge on River street, one for a \$12,000 bridge, another for one costing \$19,000, and the third for one costing \$22,000, and has agreed to recommend to the City Council that the old bridge be replaced by an iron one, with stone foundations, costing \$22,000. Report says that it was voted to build the one recommended.

#### MEETINGS AND ANNOUNCEMENTS.

##### Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Atlanta & West Point, 3 per cent., payable July 11.  
Boston & Maine, quarterly, 1½ per cent. on common stock, payable Oct. 1, and 3 per cent. on preferred stock, payable Sept. 1.  
Huntington & Broad Top, 3¼ per cent. on preferred stock and 2 per cent. on common stock, payable Aug. 10.  
Illinois Central, 2½ per cent., payable Sept. 1.  
Long Island, quarterly, 1 per cent., payable Aug. 1.  
Nashville, Chattanooga & St. Louis, quarterly, 1 per cent., payable Aug. 1.  
Toledo & Ohio Central, quarterly, 1¼ per cent. on preferred stock, payable on July 25.

##### Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

California Eastern, special, company's office, Equitable Building, Denver, Col., July 24.  
St. Lawrence & Adirondack, company's office, New York City, July 29.  
West Virginia & Pittsburgh, annual, Weston, W. Va., Aug. 11.

##### Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

American Association for the Advancement of Science will hold its forty-fifth annual meeting at Buffalo, N. Y., Aug. 22-29.  
The Northwest Railway club will hold its next meeting at the West Hotel, Minneapolis, on Sept. 15.  
The American Street Railway Association will hold its annual convention at St. Louis on Oct. 24 and 25.  
The Roadmasters' Association of America will hold its next annual meeting at the Cataract Hotel, Niagara Falls, N. Y., beginning Sept. 8.  
The Traveling Engineers' Association will hold its next annual meeting at Minneapolis, Minn., commencing Sept. 8.  
The American Institute of Mining Engineers will hold its annual meeting in Denver, Col., beginning on Sept. 21.  
The American Society of Railroad Superintendents will hold its next annual convention at Niagara Falls, N. Y., beginning Sept. 9.  
The American Association of General Passenger Ticket Agents will hold its next annual convention at Atlantic City, N. J., beginning Sept. 15.  
The Travelling Passenger Agents' Association will hold its next annual convention at St. Louis, Mo., beginning Sept. 29.  
The American Railway Association will hold its next annual convention at New York City, beginning Oct. 7.  
The Freight Claim Association will hold its next annual convention at The Jefferson, Richmond, Va., beginning Oct. 7.

##### Road and Track Supply Association.

Mr. Harry W. Frost, of the Monadnock Building, Chicago, Secretary and Treasurer of this Association, has issued a circular asking intending exhibitors at the annual convention of the Roadmasters' Association to inform him as early as possible the amount of space desired for exhibits. The convention will be held on Sept. 8, 9 and 10 at Niagara Falls, N. Y. The managers of the Cataract House have made a rate of \$3 a day for members of the Roadmasters' and Road and Track Supply Associations. No charge is made for space for the exhibition of supplies.

##### The Civil Engineers' Club of Cleveland.

A meeting of the Civil Engineers' Club of Cleveland, O., was held on July 14, 82 members and visitors present. The paper of the evening, by Mr. H. F. J. Porter, of Chicago, gave an exhaustive description of the processes used in the production of large forgings at the Bethlehem Iron Works at South Bethlehem, Pa. The exhibition of photographic plates concluded with that of Mr.

John Fritz, the active founder of this great enterprise. The speaker was followed by Messrs. Oldham and Newnam, Dr. Langley and others, in interesting remarks, and Mr. J. F. Holloway appropriately finished the topic with a tribute to the worth and ability of Mr. Fritz.

#### General Passage Agents' Association.

This association held its 31st annual meeting at Philadelphia, July 15, about 50 members being present. The President, George A. Morton, of the New York, New Haven & Hartford, occupied the chair. Papers were read by F. J. Wolfe, of the New York Central; H. A. Winter, of the Illinois Central; W. J. Taylor, of the International & Great Northern; and W. J. Robinson, of the Baltimore & Ohio.

#### American Institute of Mining Engineers.

The following provisional programme has been announced for the Colorado meeting in September: Monday and Tuesday, Sept. 21 and 22, will be spent at Denver, including sessions, visits to smelters, etc. On Wednesday, Sept. 23, a short trip will be taken to Central City and Golden. On Thursday morning, Sept. 24, a special excursion will leave for Cripple Creek, to remain there until Friday night, when the party will proceed to Leadville. Saturday, Sept. 26, will be spent at Leadville, and Sunday at Glenwood Springs. Monday, Sept. 27, will be spent at Aspen. On Tuesday the cyanide and chlorination works and the oil wells at Florence will be visited. Wednesday, Sept. 30, will be spent at Pueblo, and the party will return to Denver on Wednesday night.

#### The Western Foundrymen's Association.

The Western Foundrymen's Association met at the Great Northern Hotel, Chicago, at 7:30 p. m., Wednesday, July 15. Major Malcolm McDowell read a paper on "The Practical Value of the Various Metalloids in Cast Iron." After a discussion of the paper, the following topical questions were taken up and discussed:

1. What is the proper amount of air and the pressure of same to melt iron in a cupola, and what are the effects of too little and too much air?
2. Is it economical to ventilate a foundry artificially?
3. What is the best method of lighting a foundry of modern design?
4. Does the Thurston Autographic Torsion Machine possess any merit over any other forms of machines now in use for testing cast iron?
5. In order to overcome the variation in size of test bars incident to molding, is machining down to size to be recommended?
6. What is the effect upon coke of exposing it freely out of doors?
7. What is the utility and efficiency of flexible shafting for use with grinders on heavy and intricate castings?

#### PERSONAL.

—Mr. Leon H. Hart has resigned as Receiver of the Texas, Sabine Valley & Northwestern road.

—Mr. E. R. Henderson has been appointed Auditor and Cashier of the Macon & Birmingham road in Georgia.

—Mr. A. Douglas, Auditor of the St. Louis & San Francisco, has been made General Auditor of the reorganized company.

—Mr. L. D. Badger, Roadmaster for the Fitchburg road, with headquarters at Mechanicville, N. Y., has resigned. He had held the office ten years.

—Mr. Charles R. Barnes, of Rochester, N. Y., has been appointed electrical expert of the New York State Railroad Commission, at an annual salary of \$3,000.

—Mr. John Vanderslice, Superintendent of the Pottsville (Pa.) Bridge Works, has been appointed Superintendent of the Keystone Bridge Works, Pittsburgh.

—Mr. W. C. Modisett has been appointed Assistant Superintendent of the St. Louis & Hannibal, in addition to his duties as General Freight and Passenger Agent.

—Mr. J. D. Rahner has been appointed Assistant General Passenger Agent of the Florida East Coast road. Mr. Rahner's headquarters will be in St. Augustine, Fla.

—Mr. F. C. Dumbuck, General Freight Agent of the Chesapeake, Ohio & Southwestern, has tendered his resignation, having accepted an office with the Kansas City, Fort Scott & Memphis system.

—Mr. M. Nicholson, who was formerly City Engineer of Knoxville, Tenn., has been appointed Assistant Engineer in charge of the Chattanooga Union road, now operated by the Southern Railway.

—Mr. W. A. Pratt, who has been Civil Engineer on the Baltimore & Ohio road, at Martinsburg, W. Va., has resigned his position to accept the chair of electrical and mechanical engineering in Delaware College.

—Mr. Clarence R. Neher has been appointed Resident Engineer of the Erie Canal at Rochester, N. Y., to fill a vacancy. The salary is \$2,000. Mr. Neher was formerly Division Engineer of the New York & Pennsylvania road at Rochester.

—Mr. V. Preston has been appointed General Manager of the Sharon Iron Company, Limited, Sharon, Pa., succeeding Mr. John M. Evans, resigned. Mr. Preston has for some years been General Manager of the Apollo Iron & Steel Company.

—Mr. Cyrus Garnsey, Jr., heretofore Auditor of the Kansas City, Memphis & Birmingham at Memphis, Tenn., has been appointed Assistant Comptroller, with headquarters at Kansas City, Mo., and the office of Auditor has been abolished.

—Mr. C. D. Morris, Assistant General Freight Agent of the Louisville, Evansville & St. Louis, has been appointed Chief Clerk of the General Freight and Passenger Department and the office of Assistant General Freight Agent has been abolished.

—Mr. John G. Burkhart died at his home in Fairfield, Va., on July 4, after a long illness. Mr. Burkhart was in the employ of the Burlington & Missouri River road from 1857 to 1877, and during much of that time had charge of bridge construction for that company on various divisions of its lines.

—Mr. Ivy G. Preston has been appointed Superintendent of the New Orleans & Western road. Mr. Preston has for some time been connected with the Illinois Central freight department at New Orleans. Mr. Preston succeeds Capt. John Turner, who is now General Manager of the New Orleans & Western.

—Mr. Joseph A. Jordan, General Manager of the St. Louis & Hannibal, has been elected Vice-President of the Green Bay & Western, which has but recently been reorganized to succeed the Green Bay, Winona & St.

Paul. Mr. Jordan will continue as General Manager of the St. Louis & Hannibal, and will also have charge of the operation of the Green Bay & Western. Both properties are owned by the same interests.

—Mr. Charles Warren, General Manager of the Great Northern, has retired. Mr. James M. Barr, General Superintendent, has been assigned certain duties heretofore performed by the General Manager, and the latter office will be abolished. The announcement made by the company in regard to this change is that Mr. Warren has been granted an extended leave of absence. According to current reports he has a contract with the company which has still three years to run. Mr. Warren was formerly Comptroller of the Great Northern and had been with the company a number of years in that and other positions. He was appointed General Manager in July, 1894, succeeding Mr. C. W. Case, who had been promoted to that office in November, 1893.

—Mr. George A. Haggerty is now President of the White River Valley & Western Railroad, recently organized to build 200 miles of new railroad in Arkansas. Mr. Haggerty is a railroad officer of considerable experience in the mechanical and construction and operating departments. He has been General Superintendent of the Galena & Wisconsin road, and Superintendent of Construction of the Springfield, Effingham & South-eastern in Illinois, and General Superintendent of the Galveston, Houston & Henderson in Texas. He has also been Superintendent of Machinery and Motive Power on the Chesapeake, Ohio & Southwestern and on the Texas & Pacific and was Mechanical Superintendent of the New Brunswick road before its lease to the Canadian Pacific.

#### ELECTIONS AND APPOINTMENTS.

**Chicago, Burlington & Quincy.**—H. L. Harmon, General Agent of the freight department, at Kansas City, Mo., has been placed in charge of the passenger department in addition to his duties in the freight department, with the title of General Agent. Mr. Harmon has been connected with the Burlington route for years and was formerly with the Chicago & Northwestern.

**Cincinnati, Lebanon & Northern.**—At a meeting of the Board of Directors, on July 14, the resignation of Mr. Winslow as President was accepted, and Mr. J. T. Brooks, Second Vice-President of the Pennsylvania road, was selected to fill the vacancy. Mr. Ral h Peters was made Superintendent.

**Grand Rapids & Indiana.**—The new Board of Directors are James McCray, John E. Davidson and Joseph Wood, of Pittsburgh; J. T. Brooks, Salem, O.; William R. Shelby, H. J. Hollister and T. J. O'Brien, Grand Rapids. The following officers have been elected: President, James McCray; Vice-President and Treasurer, W. R. Shelby; Secretary, R. R. Metheany; General Manager, J. H. P. Hughart; General Counsel, T. T. O'Brien.

**Grand Trunk.**—The lines of the company have been divided for convenience in operating into four divisions, known as the Eastern, Northern, Middle and Western divisions, and subdivided into 29 districts. The Eastern Division includes the main line, Montreal to Toronto, including Harwood, Kingston and Jacques-Cartier branches, and all lines east and south of Montreal, comprising Districts Nos. 1 to 7 inclusive; the Northern Division includes all lines north of main line (except Harwood branch) between Belleville and Georgetown Junction, also line between Georgetown Junction and Hamilton, comprising Districts Nos. 8 to 14 inclusive; the Middle Division includes all lines west of Toronto and the Niagara frontier, and east of Detroit and St. Clair Rivers (except lines running north from Toronto and Hamilton which are included in Northern Division), comprising Districts Nos. 15 to 24 inclusive; and the Western Division includes all lines west of Detroit and St. Clair Rivers, comprising Districts Nos. 25 to 29 inclusive.

J. M. Riddell having been assigned to other duties, Mr. William Cotter has been appointed Superintendent of the Eastern Division, with headquarters at Montreal, Que. The office of Assistant Superintendent having been abolished, Mr. J. Webster has been appointed Superintendent of the Northern Division, with headquarters at Allandale, Ont. Mr. D. Morice and Mr. W. R. Tiffin having been assigned to other duties, Mr. E. H. Fitzhugh has been appointed Superintendent of the Middle Division, with headquarters at Toronto, Ont.

Mr. J. M. Riddell has been appointed Freight Agent at Montreal, vice Mr. A. Burns, resigned. Mr. J. R. Williams has been appointed Trainmaster in charge of First District, vice Mr. C. Woodman, assigned to other duties, with headquarters at Portland, Me. Mr. George C. Jones has been appointed Assistant Superintendent of the 15th, 16th, 17th, 18th, 19th and 24th Districts, with office at London, Ont.

**Hendersonville & Brevard.**—At the annual meeting of stockholders, held at Brevard, N. C., July 6, the following Directors were elected: H. M. Warren, A. E. Jenks, T. C. McNeely, A. E. Boardman and J. L. Bell. At a meeting of Directors the following officers were elected: H. M. Warren, President and Treasurer; A. E. Jenks, Vice-President, and T. C. McNeely, Secretary and General Agent.

**Mexican Central.**—General Manager H. R. Nickerson has announced the appointment of Mr. R. N. Thomas as Terminal Superintendent at Tampico, Mex., vice W. H. Mealey, resigned. Mr. Thomas has for some time past been the Superintendent of the company's San Luis Potosi Division, with headquarters at San Luis Potosi. Mr. F. J. Easley, his assistant, will succeed him in that office.

**Monson.**—Officers of this Maine road have been elected as follows: President, H. A. Whiting; Clerk, J. F. Sprague; Directors, H. A. Whiting, H. O. Whitney, J. F. Kimball, J. F. Sprague, A. W. Chapin, W. L. Estabrook and H. E. Morrill.

**Ohio River.**—J. K. Dye, of Parkersburg, W. Va., has been appointed Traveling General Freight Agent, with headquarters at Huntington, W. Va.

**Oregon Improvement Co.**—The position of General Freight and Passenger Agent, formerly held by Harry A. Kyer, has been filled by the promotion of E. W. Clark, formerly agent of the same company at Anacortes, Wash.

**Oregon Railway & Navigation Co.**—The following Directors have been elected: C. S. Fairchild, of New York; W. W. Cotton, Henry Failing, H. W. Corbett, W. M. Ladd, C. H. Lewis, W. B. Ayers, A. L. Mills, E. S. Spencer, E. McNeil, J. G. Woodworth and W. H. Kennedy, all of Portland, Or., and Miles C. Moore, of Walla Walla, Wash. The newly elected Directors have elected the following officers: President, E. McNeil;

General Auditor, E. S. Benson; Treasurer, George E. Withington. The election of Vice-President and Chairman of the Board of Directors has been postponed until a future meeting. The reorganized company will take charge of the property August 1.

**Southern.**—Mr. B. B. Arwood, who has been Assistant Roadmaster for the Sixth Division (the East Tennessee, Virginia & Georgia, and connections), has been transferred to the Fifth Division of the same road (the Georgia Pacific), as Assistant Roadmaster. Mr. Arwood will continue to have his headquarters in Anniston, Ala.

G. A. Warlow has been appointed Superintendent of Telegraph and J. H. Sampson Superintendent of Car Service of the Knoxville, Cumberland Gap & Louisville, now a division of this road.

**Texas Central.**—Mr. Joseph McWilliams having resigned the office of Engineer and Superintendent to accept service with another company, that office has been abolished. Mr. W. T. Gould, Resident Engineer, assumes charge of all engineering and construction, under the direction of the General Manager, Mr. Charles Hamilton. Mr. N. H. Brown has been advanced from the position of Roadmaster to that of Superintendent of Transportation. Mr. J. P. Head has been advanced from the position of Foreman in Bridge and Building Department to that of Roadmaster.

**Wellston & Jackson Belt Line.**—At a meeting of the directors at Columbus, O., July 11, the following new officers were elected: President, C. O. Hunter, General Solicitor of the Columbus, Hocking Valley & Toledo; Secretary and Treasurer, W. N. Cott; Counsel, C. O. Hunter; Auditor, F. B. Everett; Chief Engineer, F. B. Sheldon. The line is operated by the Columbus, Hocking Valley & Toledo.

#### RAILROAD CONSTRUCTION, Incorporations, Surveys, Etc.

**Baltimore & Ohio.**—Contracts have been awarded for extensive improvements to the terminals at Pittsburgh. The work to be done includes an extension of the yard facilities, and involves considerable masonry work and street paving. The Drake & Stratton Company, of Philadelphia, has the contract for about 10,000 yds. of masonry. Booth & Flynn, of Pittsburgh, were awarded a contract for paving. It is estimated that the work to be done will cost about \$200,000.

The company will, this fall, relay the line from Grafton to Wheeling, W. Va. with new rails throughout. The rails now in the track are badly worn, and the section carries a large proportion of the Eastern and Western through traffic.

**Carolina, Tennessee & Ohio.**—Mr. Frank H. Blodgett, contractor for building the road between Wilmington and Southport, N. C., has begun active work clearing the right of way in Brunswick County. The grading will commence in a few days and will be pushed steadily forward. It is expected to begin laying rails in August, and to complete the 30 miles of road by November 30.

**Cassville & Western.**—This road has just been completed between Exeter, on the St. Louis & San Francisco main line, to Cassville, Barry County, Mo., a distance of five miles. J. M. Bayless, of Cassville, the President and General Manager, is the principal owner of the road. It is expected that it will be extended from Cassville to Harrison, Ark., 62 miles. Chief Engineer Bond, of the St. Louis & San Francisco, made the surveys for the road and ran a preliminary line to Harrison. D. L. Mitchell is Secretary and J. M. Stull, Engineer, of the new company.

**Charleston, Clendenin & Sutton.**—Work on this line, which is to ultimately extend from Charleston to Sutton, Broxton County, W. Va., is being pushed rapidly at present. An iron bridge 100 ft. in length, over Big Buffalo Creek, was completed last week, and track-laying is being pushed beyond that point.

**Chester & Becket.**—The Massachusetts Railroad Commissioners have granted the necessary authority to this company to construct its road. The line is to be a little over five miles in length, extending from the town of Chester, Mass., on the Boston & Albany to the quarries of the Hudson & Chester Granite Co., at Becket. The cost of construction is estimated at \$94,000. The line extends for nearly all of the way through woods and there are three highway crossings at grade and one overhead bridge. The maximum grade is 264 ft. to the mile. This continues for a distance of 1.135 miles, and is the heaviest grade in the state. The President is Zenas Crane, of Dalton, Mass., and the Engineer is J. B. Haviland.

**Chicago & Northwestern.**—The grading on the extension from Gillet, Wis., to a point on the Minneapolis, St. Paul & Sault Ste. Marie, near Cavour, is finished, and rails will be laid at once. It is expected to be in operation by fall.

**Chicago, Milwaukee & St. Paul.**—Work on the second track of the Council Bluffs & Omaha division, has been resumed, and the additional track will be completed as far as Genoa, 57 miles from Chicago, by Sept. 1. It is expected that by the first of next year the division will be double tracked through to Savanna, on the Mississippi River, 138 miles from Chicago.

The company is making preparations to double-track its line between Chenoweth, a point about 10 miles west of Elgin and Chicago. When this work is completed the suburban service on that line will be greatly increased and the running time of all trains reduced.

**Flint & Pere Marquette.**—The grading is all done on the Toledo extension of the road, but failure to receive material for the bridge across the River Raisin at Monroe, and for other construction work, is delaying the work so that the opening of the new extension will not occur as early as promised. The company does not now think the line will be ready to operate before Oct. 1. The extension is 18 miles long from Monroe to within three miles of Toledo.

**Florence & Cripple Creek.**—A party of engineers are at Victor, Col., surveying a proposed new line to Goldfield and Altman, Col. The new road will be about 12 miles long. All of the rails formerly in use in Eight Mile canon, where the road has been rebuilt near Adelaide, are being taken up and shipped to Victor, for use on the new branch.

**Fort Worth Belt.**—Surveyors have run a line from the Missouri, Kansas & Texas tracks in Fort Worth, Tex., to the stock yards for the first section of the new belt line which will eventually encircle the city. The grading will be begun immediately.

**Glenwood.**—This company was incorporated in Pennsylvania on July 21, to build a connecting road from a point on the main line of the Pittsburgh & Connellsville (Baltimore & Ohio), where it crosses Second

avenue in Glenwood, in the Twenty-third ward of Pittsburgh, to a point on the main line of the same road between the stations of Marion and Laughlin Junction in the same ward and city. The length of the road will be about two miles. James B. Washington, of Pittsburgh, is President.

**Gulf, Rio Grande & Pacific.**—Articles of incorporation of this company have been filed with the Territorial Secretary at Santa Fe, N. Mex. The incorporators are H. L. Warren, of Albuquerque; Wm. Hutchison and B. Y. McKyes, of Deming, N. Mex.

**Joliet.**—This company was recently incorporated at Joliet, Ill., with a capital stock of \$300,000. The incorporators are Jacob A. Henry, J. W. Folk and W. B. McKinley.

**Kings County Elevated.**—The connection between this road and the Brooklyn & Brighton Beach road, in Brooklyn, N. Y., by means of the Franklin avenue elevated spur will be completed on July 22, and cars will then be run direct from the New York & Brooklyn bridge to Brighton Beach.

**Lawrenceburg, South Bend & Milwaukee.**—It is reported that a project is under way to build a road from Lawrenceburg, Ind., to Benton Harbor, Mich., connecting with Milwaukee from that place by means of transports. Mr. John M. Caulfield, an Indiana capitalist, is at the head of the project. The new line will probably be known by the above name.

**Mexican National.**—The Federal Government of Mexico has granted a concession to this company for an extension of its line from Patzcuaro to Uruapan, in the State of Michoacan, Mex. The survey of the line will begin during September, and it is expected to follow up the construction work without delay. The work will be done by the company upon its own account.

**Mexican Roads.**—It is announced that the concession granted by the Government of Mexico for building a road from Baroteran to Tampico and thence to the City of Mexico has been declared forfeited, owing to the failure of the company obtaining the concession to carry out its stipulations. The deposit of \$20,000 made by the company goes into the Federal Treasury. The company was composed of Chicago and New York capitalists. They have sent an agent to the City of Mexico for the purpose of having the action of the Government in forfeiting the concession rescinded.

Reconnaissance have been started from Guadalajara, Mex., under Engineer Rosendo Corona, for the location of the long proposed line from Guadalajara to the port of Chamela on the Pacific. The concession is now held by Engineer Mariano Barcena.

**Minneapolis, St. Paul & Ashland.**—Grading has been completed for the first 25 miles of this road, southwest from Ashland, Wis. The contracts for the remainder of the line, to St. Paul and Minneapolis, are about to be let in Minneapolis. The road, when completed, will be about 180 miles long, and will open up valuable hard wood and pine forests in northwest Wisconsin.

**Mississippi, Colesburg & Manchester.**—This company has decided to build a railroad from Colesburg to Dyersville, Ia., through Petersburg and New Vienna, to connect with the Illinois Central and the Chicago Great Western. This road will be about 16 miles long and will go through a rich and fertile section of Iowa. A five per cent. tax has been rated in Colony Township, in which Colesburg is located, the tax amounting to about \$16,000. One-half is due Sept. 1, 1897, and the other half Sept. 1, 1898. Propositions for operating the line have been made by two railroad companies. The road would get a good business, having access to five towns along the line. Dyersville is a town of 1,500 inhabitants and situated on the main line of the Dubuque & Sioux City and Chicago Great Western. Other towns are New Vienna, a town of 400, and Luxemburg, Holy Cross, five miles from New Vienna and Petersburg, and then Colesburg. It is estimated that this road would get in freight alone 1,500 carloads a year. Contractors or construction companies are invited to correspond with W. C. Kirchheck, Secretary, or F. A. Grimes, General Manager, of Colesburg, Ia.

**Missouri Central.**—This company has been organized in Chicago to build a road in Missouri from Versailles to Lebanon, a distance of 60 miles. The proposed road will pass through several county seats and will open up a rich mining section in Missouri with coal, lead and zinc ores.

**New Roads.**—A company has been organized at Houston, Tex., to build a road to connect Bay City with Bolivar, Tex., a point about seven miles above Columbia, on the Brazos River, in Brazaria County. An old road bed built many years ago from Columbia to Wharton will be used, thus giving about 20 miles already graded. The road when finished will be about 35 miles long. It is proposed to extend the road, ultimately, from Bolivar to Chenango, a distance of about 140 miles, to connect with the Velasco Terminal.

It is probable that a road will soon be built to connect the Flour Bluff lands, in the southern part of Nueces County, Tex., with the San Antonio & Aransas Pass line, at Corpus Christi, Tex. An old light railroad, built in "boom" days, extends from Corpus Christi to Aberdeen, five miles below, and this road will be used, and extended 11 miles further south. It is proposed to transform the fertile lands at Flour Bluff into a large vineyard, if adequate means of transportation can be secured.

**Oregon Railway and Navigation Co.**—Articles of incorporation of the new company were filed at Portland, Or., last week, with Henry Failing, E. McNeill and W. W. Cotton, as incorporators.

**Pittsburgh & Western.**—A five-mile section of second track between Downieville, in Butler County, Pa., and the western end of the Bakerstown tunnel, 13 miles from Pittsburgh, has been opened for regular traffic.

**Pittsburgh, Shenango & Lake Erie.**—The preliminary survey for the proposed change of the roadbed between Branchton and Grove City, Pa., goes around Harrisville. This survey is said to secure a 30-ft. grade, while the present roadbed from Branchton to Harrisville station has a grade of nearly 90 ft.

**Queen Anne's.**—Rails have been laid from Queens-town, Md., to within two miles of Queen Anne's, about 15 miles from Chesapeake Bay, and construction trains are now passing over this, the Western division of the road; grading will be finished to Hillsborough in a few days. On the contract from Greenwood, Del., to Denton, Md., work has been finished to the state line, seven miles from Denton. The road, when finished, will give a very direct line across the Maryland peninsula, from Queenstown on Chesapeake Bay to Lewes, Del., on the Atlantic coast.

**Saupe Valley.**—On July 9, the change in gage was completed, and hereafter the road will be run as a standard-gage line with new equipment. The track force will

work at present on straightening up the new track between Nephi and Manti and then the road from Manti to Morrison will be made standard gage.

**Sebastian & Cincinnati.**—This road, when completed, will connect Cincinnati, a new settlement in Bernard County, Fla., with Sebastian, on the extension of the Florida East Coast line. It will be about 10 miles in length, extending west from the Atlantic Coast. Eight miles of grading has already been completed, and the rails will be laid immediately. The road is being built as part of a land-development plan, which includes, further, the building of 32 miles of irrigation canal.

**Short Line (West Virginia).**—This is to be a standard-gage road, beginning at New Martinsville, Wetzel County, W. Va., and following Fishing Creek to its headwaters, thence across to Harrison County, W. Va., and by way of Middle Run and Ten Mile Creek to West Fork River and Clarksburg, W. Va. The surveys have been completed and grading is now being pushed from New Martinsville. The Harrison County Court has called a special election in several districts of that county for Aug. 15 to vote on the proposition to issue bonds for \$80,000. Preliminary surveys for a continuation of this line from Clarksburg to Belington, W. Va., where it would connect with the West Virginia Central & Pittsburgh, are to be made.

**Southern California.**—It is reported that an extension will be built from Redondo Beach, on the California coast, south to San Pedro, about 15 miles. Surveys are now in the field selecting a route.

**Terminal of Buffalo.**—The agents for this line have secured all the rights of way necessary for the connection between Depew and Blasdell, N. Y., 10 miles, and active work will be begun without delay.

**Union & Northwestern.**—This company has recently filed a charter in Louisiana to build a road out of Farmerville, La. W. H. Chandler, of Farmerville, General Manager, wishes to communicate with an engineer to take charge of the engineering work on the line.

**Wheeling & Lake Erie.**—The second track work between Wheeling and Toledo, O., and work on the extension from Martin's Ferry, O., to Bellaire, O., by way of Aetnaville and Bridgeport, will be put under way this fall. The company's charter was amended last week, permitting the issue of \$5,000,000 of new stock, increasing the capitalization from \$14,500,000 to \$19,500,000. The new stock was authorized by the stockholders some months ago.

**Wheeling Bridge & Terminal Railway Co.**—The United States District Court, West Virginia, has authorized Receiver Brewster to expend \$10,000 in building an extension from the Top Mill Tunnel, in Wheeling to a point opposite the furnaces of the Wheeling Iron & Steel Co. The extension will permit the direct delivery of ore and other freight direct from the Cleveland, Lorain & Wheeling, Baltimore & Ohio, and Wheeling & Lake Erie to the mills and furnaces in the district reached. Heretofore freight has been transferred by boat. The work will be done with money in the Receiver's hands.

**White River Valley & Western.**—The surveys have already been begun for this road, recently incorporated in Arkansas, as stated last week. The line as proposed is from a point on the St. Louis, Iron Mountain & Southern, at or near Bald Knob, Ark., through the counties of White, Cleburn, Independence, Stone, Baxter, Marion, Searcy, Newton, Boone, Carroll, Madison and Washington, to Stillwell, I. T., on the Kansas City, Pittsburgh & Gulf, a distance of 275 miles. The route is east and west through a populous and well developed country, rich in lead, zinc, iron and coal, marble and onyx, and heavily timbered with oak, pine, black walnut and cherry wood. Forty miles of the line are now being located in Washington County, and a survey of the whole line will be made at once. Mr. G. A. Haggerty, of Fayetteville, Ark., is President of the company.

**Wilkes-Barre & Northern.**—Grading between Luzerne Borough and Dallas, in Luzerne County, Pa., has been finished, with the exception of a cut at Trucksville, four miles south of Dallas. At the completion of the grading on this section, rails will be laid, and grading from Dallas to Harvey's Lake, about five miles, will be begun. The road when finished will be about 15 miles long, running from Luzerne, north to Harvey's Lake.

#### Electric Railroad Construction.

**Adrian, Mich.**—It has been proposed to utilize the old roadbed of the railroad which formerly ran from Adrian to Tecumseh by putting in an electric line between the two cities, a distance of about 10 miles.

**Albany, N. Y.**—The City Railway Co. proposes to build an electric road from Albany to Cohoes, a distance of about 11 miles, by the way of Londonville, Newtonville and Lathams' Corners. The only street-car line at present between the two cities is by the way of Troy.

**Baltimore, Md.**—Work will be commenced about Aug. 1 on the 17 miles of new track to be laid in East Baltimore by the Central Railway Co. It is stated that \$500,000 will be expended on the new line and equipment. A ground rail will be used and from 75 to 100 new cars purchased. A new power-house will also be built.

The Falls Turnpike Co. has sold to George R. Webb for \$5,000, the right to construct a single or double-track line from the point where the northern boundary line of the city crosses the turnpike to the tracks of the Northern Central Railroad at Mount Washington.

**Bath, N. Y.**—Surveys have been made on the proposed electric road between Bath and Hammondsport, on Keuka Lake. Buffalo and Syracuse parties are interested in the project.

**Burlington, Vt.**—A franchise has been granted to the Burlington & Hinesburg Railroad Co. for an entrance into Burlington. The line is to be 13 miles long and is to be operated by electricity instead of steam, as was originally intended.

**Canton, O.**—Application has been made to the Council at Canton for permission to construct an electric line on some of the principal streets in the city.

**Detroit, Mich.**—The Detroit Electric Railway Co. has been incorporated with a capital stock of \$50,000.

**Glens Falls, N. Y.**—The Street Railway Co., of Glens Falls, began to build the South Glens Falls extension last week.

**Hartford, Conn.**—The railroad committee and street board have reported adversely on the petition of the Hartford Street Railway Co. to lay tracks on Putnam

and Russ streets, and favorably on the petition to lay tracks on Park street from Zion to Laurel streets.

**Hull, Que.**—The Hull Electric Railway Co. is making arrangements for building loop lines in and about Hull.

**Marion, Ind.**—Washburn & Moer Manufacturing Co., of Worcester, Mass., has received the contract to supply \$17,000 worth of trolley wire to the Clodfelter Electric Railroad Co. About one-half of the grading is completed between Marion and Anderson, and the two power-houses referred to last week are being built. It is stated that \$200,000 has already been expended on the road.

**Mason City, Ia.**—W. E. Brice and L. H. Ong have been granted a 25 years' franchise for an electric line in Mason City. A line will also be built between that city and Clear Lake, a distance of 10 miles. Work will be commenced within 60 days, and completed by June 18, 1897.

**Montreal, Que.**—The Montreal Park and Island Railway Co. recently let the contract for the construction of the four miles of new line known as the St. Vincent de Paul branch. The road is to be completed this fall.

**Milwaukee, Wis.**—A franchise has been granted to the Milwaukee & Waukesha Street Railway Co. for the construction of an electric line between Milwaukee and Waukesha. Bonds to the amount of \$1,000,000 are to be issued under the trusteeship of the Illinois Trust and Saving Bank.

**Oneonta, N. Y.**—It is proposed to build a belt line electric line in Oneonta. The consent of many of the property owners has been secured.

**Parkersburg, W. Va.**—The Park City Street Railroad Co. recently passed into the control of an Eastern syndicate. The road is being rebuilt throughout, and will be equipped with electricity.

**Philadelphia.**—The Select Council on July 16 passed the \$8,000,000 loan ordinance which was promptly approved by the Mayor. Among the items is \$150,000 for improvement of suburban roads.

**Pittsburgh, Pa.**—A charter was issued July 15 by the State Department to the Pittsburgh and North Side Traction Co. to build a line in Pittsburgh for a distance of six miles. Capital \$36,000. Directors, W. E. Woodwell, James H. Hammet, H. W. Smith, Pittsburgh; Ed. Whittash, Beaver, President, Chas. H. Steele, Steubenville, O.

The West End Street Car Co. has purchased the franchise of the Little Saw Mill Run road, and has secured the right of way through the greater part of the route from West End, in Pittsburgh to Manongahela. The road will be known as the West Side Belt Line, and will extend through Saylorsville, West Liberty and Curry Station, thence up the river to Manongahela, a distance of 27 miles. A branch road will be built from Curry to Duquesne, a distance of 10 miles.

**Port Richmond, S. I., N. Y.**—The contract for the construction of the electric line under control of the Thomas Syndicate in Richmond avenue, Port Richmond, has been awarded to Brown & Quien, and work will be begun in a few days.

**St. Louis.**—On July 17 the Southern Electric Railway Co. filed articles providing for the extension of its line to Jefferson Barracks.

**Springfield, Vt.**—Work was begun last week on the building of the Springfield Electric Railroad. The road was organized June 17, with a capital stock of \$50,000, to build an electric road from Springfield, Vt., to Charleston, N. H., a distance of about eight miles.

**Syracuse, N. Y.**—The Onondaga Lake Railroad Co. has been incorporated in Albany to construct a double track electric road about seven miles in length from Clinton Square in Syracuse, to the resort known as Long Branch, Onondaga Lake. The capital is \$250,000, and among the Directors are John S. Kaufmann, W. R. Smith, Bruce S. Aldrich and Edward A. Powell, of Syracuse.

**Toronto, Ont.**—Notice has been given that application will be made to the Dominion Parliament for an act to incorporate the Toronto Radial Railway Co. with power to take over the franchise of the Toronto Belt Line Railway Co. and to convert the present belt line into an electric road.

**Watch Hill, R. I.**—It is proposed to begin the work of extending the Sea View electric road to Narragansett Pier very soon.

**Rome, Italy.**—The municipality of Rome has approved a measure compelling the Roman Tramway Co. to entirely abolish horse traction and to substitute electric traction on its entire system, the transformation to be completed within four years. Work is in progress under the direction of the General Electric Co. of America and the Siemens & Halske Co., of Berlin. It is stated that the motive power will be derived from the Trivoli-Rome transmission plant, and arrangements will be made for additional power to be transmitted by polyphase currents. The trolley system will be adopted on most of the lines and the Siemens & Halske underground conduit system in the principal thoroughfares.

#### GENERAL RAILROAD NEWS.

**Atlantic Short Line.**—Judge Spear, of the United States Court in Georgia, has issued a decree for the sale of this road on Aug. 11, at Swainsboro, Ga. The minimum price fixed in the decree for the purchase of the road is \$210,000.

**Baltimore & Ohio.**—Judge Morris, of the United States Court at Baltimore, signed an order requiring the Receivers to show cause on or before Sept. 5 why the Johns Hopkins University and other holders of the preferred stock of the road should not be paid the guaranteed interest of six per cent. on their stock. The company owes the University \$27,433.47, due July 1, on the stock. The University claims that this interest charge is a first lien upon the gross profits of the company.

**Delaware River Railroad & Bridge Co.**—The stockholders of this company, at a special meeting held in Camden, N. J., on July 17, voted in favor of the creation of a first mortgage 4 per cent. loan of \$1,300,000, and the issuance of bonds. The mortgage will cover the company's property in Pennsylvania and New Jersey, chiefly bridge across the Delaware which is used by the Pennsylvania road.

**Kansas City & Omaha.**—The road has been sold at auction, and bid in by attorneys representing the stockholders, the consideration being \$150,000. The property sold consists of lines in Nebraska, from Fairfield to Stromsburg, Fairbury to McCook Junction and

**Alma Junction to Alma,** a total distance of 193 miles. The sale is the result of a decree of foreclosure rendered in the circuit court of the United States, March 4. A new company has been incorporated with a capital stock of \$3,000,000, by Edward Dickinson, Thos. M. Orr, William J. Carroll, William R. Kelly and Erastus Young. The road will continue to be operated by the Union Pacific.

**Lake Erie & Detroit River.**—An agreement has been arrived at between the Michigan Central and this company by which the former has secured the running powers over the London & Port Stanley road, which the above company leases from the city of London. The privileges cover a term of 15 years.

**Oregon Railway & Navigation Co.**—The new company was organized at Portland, Ore., last week, no change in name being made. The capital stock of the new company is fixed at \$35,000,000. The company is to operate both the railroad and steamship lines of the former Oregon Railway & Navigation Company and to build all the new lines contemplated by the former company. The capital stock is to be divided into two classes: Preferred stock, \$11,000,000; common stock, \$4,000,000.

The Elgin branch of this road has been sold at Union, Ore., for \$571,298 to the purchasing committee of the second mortgage bondholders of the road.

**Portland & Rumford Falls.**—A hearing has been ordered by the Maine Railroad Commissioners for July 23, at Canton, Me., on petition of this road for a branch line to extend from Canton to the pulp mills at Jay, a distance of six miles.

**Seattle, Lake Shore & Eastern.**—The Bondholders' Committee has issued a circular to depositors going over recent events relating to the company. In regard to the report that a judgment by default has been obtained against the road in favor of the Northern Pacific receivers, the committee says that the facts are: On May 10 all the property was sold at foreclosure and bought in its entirety by this committee. On June 9 the court confirmed the sale and the deed has been made and recorded in the various counties through which the road extends. Two new corporations have been formed, one owning the property east, and the other the property west of the Cascade Mountains. They include everything formerly owned by the Seattle, Lake Shore & Eastern Railway Company. The new securities will be held in trust, as provided, and the first stockholders' meeting, when the new directors will be elected and formal organization completed, will be held in Seattle, Sept. 28. As to the judgment secured by Northern Pacific, the same question was argued in 1894 and the court decided that the Northern Pacific had no claim for this money ahead of the lien of the first mortgage. As the properties have all been sold under this mortgage, the judgment is an empty one, for it is virtually a judgment against a defunct corporation. A deficiency in interest of \$5,700,000 having been established by the sale of the property for \$1,000,000, the committee, under advice of counsel, has taken steps to prove the validity and the legality of the indorsement upon the bonds by the Northern Pacific.

**Union Pacific.**—The following statement shows the earnings for May for three years:

	1896.	1895.	1894.
Gross earn. ....	\$1,763,984	\$1,765,139	\$1,940,060
Oper. exp. ....	1,153,393	1,147,932	1,593,854
Net earn. ....	\$610,591	\$617,206	\$346,206
Net 5 mos. ....	2,843,735	5,517,547	2,195,197

#### Electric Railroad News.

**Detroit, Mich.**—The Detroit & Saline Plank Road Co. has sold its rights and franchises to Albert Pack, of the Detroit Railway Co.

**Newark, N. J.**—The Consolidation Traction Co. has paid to the city of Newark, \$54,742.23, the amount which the company computes is 5 per cent. of its gross earnings for the year ending April 30, 1896. This is an increase of \$15,507.81 over last year. The South Orange Co. also paid \$8,376.96, an increase of \$918.47 over the preceding year.

**Saratoga, N. Y.**—The Union Electric Railroad, of Saratoga, which operates 10 miles of road, extending from Saratoga Lake to Saratoga, was sold under foreclosure July 18 to Bertron & Storrs, bankers, of New York, for \$8,500, subject to a mortgage of \$100,000. The road was chartered Nov. 11, 1890, and a Receiver was appointed in March, 1896.

**Worcester, Mass.**—The Board of Railroad Commissioners has refused to approve the lease of the Worcester Shrewsbury Street Railway Co. by the Worcester Consolidated Street Railway Co. The net rental for the leased roads was to be \$4,900, but this was considered too much by the Commissioners, and hence the disapproval of the lease.

#### TRAFFIC.

##### Traffic Notes.

During the absence of Mr. Blanchard in Europe, Mr. Goddard will perform the duties of Commissioner of the Joint Traffic Association.

The New York, Ontario & Western now has in operation, or soon to be put in service, four large barges to carry coal to New England markets.

Four canal boats arrived in New York this week with 11,700 barrels of Minnesota flour. This is the first large shipment of flour that has come by canal for several years.

The Baltimore & Ohio announces on its Pittsburgh Division round trip local tickets, good Saturday, Sunday and Monday, at half price, the minimum charge to be 25 cents.

The Ohio River Railroad and the Pittsburgh, Cincinnati, Chicago & St. Louis have arranged a through parlor car service between Pittsburgh, Pa., and Parkersburg, W. Va., by way of Wheeling.

The Railroad Commissioners of Iowa recently issued a revised freight tariff on hay, making an increase of about 25 per cent. in some of the rates. This, according to a Western paper, has aroused violent opposition on the part of the shippers, and the Commissioners will on July 31 hear arguments for a reduction of the rates.

The Massachusetts Railroad Commissioners have granted the petition of citizens of Northampton and Shelburne Falls for a restoration of the midday trains on the New York, New Haven & Hartford between those places. The Commissioners, after a full hearing of the petition, say that they see no reason for the discontinuance of the trains.

A press dispatch from St. Paul states that the Great Northern Railway has signed a traffic contract with the Japanese Mail Steamship Company (headquarters at Tokio), which is to run steamers monthly between Tokio and Seattle. Flint & Co., of New York, have established a line of clipper ships from New York to San Francisco around Cape Horn. They have 11 vessels.

The Supreme Court of Rhode Island has granted an injunction against the New York, New Haven & Hartford to restrain it from putting objectionable marks upon freight consigned to a certain firm in Providence. The marks are letters and numbers stamped in red and are understood to denote the time of arrival. The retailers object to the disfigurement and the wholesalers have made the protest.

The Committee of Presidents of the Joint Traffic Association appointed to negotiate with the principal roads in the western part of the association territory which are not members, has had conferences with some of them and it was reported this week that the Lake Erie & Western had decided to join. We are unable, however, to get authentic confirmation of the report, and the most that can be said is that Mr. Brice, President of the road, is considering the matter.

The Illinois Central has made a contract with the Cleveland, Cincinnati, Chicago & St. Louis to run through passenger trains between Chicago & St. Louis by way of Champaign, Decatur and Pana, 206 miles over the Illinois Central and 98 miles over the Cleveland, Cincinnati, Chicago & St. Louis. This contract takes effect Aug. 1. At present the Illinois Central's connection with St. Louis is over the Vandalia line, by way of Effingham.

The Southern Railway has begun running its steamboat line between Baltimore and Norfolk, and the old "Bay Line," controlled by the Seaboard Air Line Railroad, has reduced rates on both freight and passengers. The press dispatches are not very definite, but it appears that the reduction on freight southbound is 33½ per cent. to the principal southern points on the Seaboard Air Line, and on passenger fares a reduction of \$9 to and from Atlanta. The Seaboard Air Line tried to get its connecting steamers to reduce freight rates from New York and Boston, but did not succeed. The Merchants and Miners' Line (steamships) reduced freight rates from Baltimore. The Bay Line announced free berths to passengers going to Richmond. The Southern's steamers met the reductions of the Bay Line from Baltimore to Richmond, Norfolk and Old Point Comfort, but at this writing has not made reductions on its railroad lines. A meeting of the Southern States Freight Association (to which the Southern Railway belongs) was to be held on Wednesday, to consider the question of meeting the reductions of the Seaboard Air Line. The Railroad Commissioners of North Carolina have notified the latter road that if it reduces interstate rates it must also make corresponding reductions in the rates within North Carolina.

The Railroad Commissioners of Massachusetts have denied the petition of the People's Steamboat Company, of Fall River, for leave to run Sunday excursions, and have ordered that the Providence, Fall River & Newport Steamboat Company run only two steamers each way on Sundays between Fall River and Providence. The following conditions are appended to this order:

1. No one of the said steamboats shall be run in whole or in part as a special or excursion boat, or on other than its regular route between said cities, stopping or touching only at Bristol and Bristol Ferry.
2. The fares and ticket rates charged or collected for transportation on said boats shall in no case be less than the regular week-day fares and rates charged or collected by said company for transportation between the same points on the line or route aforesaid.
3. No spirituous or intoxicant liquor shall be sold or furnished by said company, or shall be allowed to be sold or furnished by any person on said boats on the Lord's day.
4. The authority hereby given may be revoked at any time in the discretion of the board, after notice and hearing, for cause shown.

With respect to the People's line petition, the board says that since this company does not maintain a service for the regular and necessary transportation of persons or merchandise, but runs a steamer only in the summer season for the special accommodation of pleasure and excursion travel, and since it does not appear that, within the meaning and intent of the statutes, "the public necessity and convenience require, having regard to the due observance of the day," the running of such a boat on the Lord's day, and it not being shown or claimed that the boat is to be run as a work of charity, it is, therefore, ordered, that the board decline to grant the prayer of the said last mentioned petition."

#### Grain Traffic on the Erie Canal.

BUFFALO, N. Y., July 20, 1896.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In reply to your inquiry concerning the complaint of the canalboat men that the elevators of Buffalo, instigated by the railroads, discriminate against the canals, to the great injury of the carrying trade thereon, it is fair to say that the agitation of this subject is mostly, and probably wholly, the result of the loud-mouthed and unsubstantial claims of certain canal men who have a greater love for talking than they have for the actual work of carrying grain.

After making extended inquiry I am unable to find that any considerable share of the ownership of the elevators here is in the hands of railroad men or of any one interested in railroad property. All of the elevators in this city except two are associated in two associations—the Western Elevating Association and the Associated Elevators. The two individual elevators are run, one by Thomas Ryan and the other by G. H. Raymond. These two compete with the associations, but it does not appear that so far this season they have been able to do much business. The two associations work in harmony and they are understood to pool their earnings. The rate for elevating, weighing and discharging is ½ cent per bushel, and for storage ¼ cent per bushel for each 10 days.

It is often alleged that the profits of the elevators are large, but persons who are understood to be fully posted concerning their management say that the dividends do not exceed 6 per cent. Certain elevators are idle, the owners receiving a share of the earnings of the pools. Whether the grain business as a whole would be any better off if the pools were dissolved and these idle elevators competed actively for what business they could get, which would mean a cutting of rates, it is impossible to say.

You will have observed that when the boatmen complained to the Produce Exchange, of New York City, asking aid in getting elevator charges reduced, they were met by several criticisms of their own methods, and it is reported that they promptly acceded to the demand of the New York merchants for a reduction of 50

per cent. in the demurrage rate on boats detained at New York; that is, from \$10 a day to \$5. Another reason for the dullness of canal traffic is the fact that a good many of the conditions are pleasanter when dealing with the railroads. Rates being equal, shippers of export grain will always send by rail. They have, in the first place, an absolutely reliable concern to deal with; in the next place, they are able to get from the railroads various courtesies when it is found that the arrival has not been properly timed for the steamer for which the cargo is intended. With the canalboatman, however, every little accident regarding time is looked upon as legitimate ground to make the shipper pay. If the smallest overtime is required the limit of expense is enforced, and it is no wonder, the grain men say, that they should go to transportation interests that deal liberally with them. Indeed, many shippers are willing to pay a fractionally higher rate for the sense of security they feel when dealing with the railroads.

The boatmen complain because grain is carried by rail from both Buffalo and Erie to Baltimore and Philadelphia at one cent a bushel less than to New York. This makes about as serious competition for the boatmen as though the railroads carried grain to New York at one cent less than they do, but it is hard to see how there is any help for this state of things. It is not at all likely that the roads leading to New York would allow the grain to go to Philadelphia if they could help it, and the fact that they do peaceably agree to this one cent differential indicates that the roads to the more southerly cities have it within their power to get the grain. This one cent is as powerful a factor as though it were a gold dollar. The rate from Buffalo and Erie and other lake ports to New York is five cents, including Buffalo charges of ½ cent. The canal rate is 4½ cents, which, after deducting the Buffalo charge, makes the rate 3½ cents. The rail rate to New York, less Buffalo charges, is 4½ cents, and on the surface it would appear that the boatmen are making a rate to get the business, but the rate to Baltimore and Philadelphia is only four cents, or, after deducting Buffalo charges, only 3½ cents, that is, ½ cent lower than the net canal rate to New York, to say nothing of the \$7 to \$11 charge for towing that accrues on canal grain intended for harbor delivery. It is plain enough where the boatmen's troubles originate; it is in their inability or unwillingness to compete with the very low rates for carrying in cars that the railroads have been able to give the last few years.

The shipments of grain by canal from Buffalo to New York for the first two months of this season amounted to 4,064,600 bu., and those by rail to 10,934,400 bu.

#### Chicago Traffic Matters.

CHICAGO, July 22, 1896.

The executive officers of the Southwestern roads have agreed to a complete readjustment of grain rates. It has been agreed that through rates from the territory south of the so-called Beatrice line shall be one cent per 100 lbs. less than the sum of the locals, except where the established percentage via certain points makes a greater difference than the maximum difference of two cents. Through rates to New Orleans from Kansas points south of the Union Pacific are to be 12 cents higher than the rates to St. Louis. The present differentials between Galveston and New Orleans are to be maintained. The tariffs now adopted advance the present grain rates from the Southwest to Chicago about 4 cents per 100 lbs. They cannot go into effect before Aug. 5, on account of several reduced tariffs that cannot be abrogated. The Ft. Scott and Memphis, the Union Pacific and the Burlington & Missouri River roads were not represented at the meeting, so the situation still remains somewhat unsettled.

The Railway Mail Exchange, of this city, after an existence of 15 years, has been abolished under the Postmaster-General's recent order restricting the free transmission of railroad letters. The attorneys of the principal Chicago roads will take the question up with the Postmaster-General and attempt to have him modify his order.

A Chicago freight official of an eastbound line has obtained current figures showing the diversion of lard and corn to Southern and Southeastern ports during the year ending June 30 last. The figures are in the shape of a comparative statement showing the total exports from the leading ports and are as follows:

LARD, POUNDS.			
Via—	1896.	1895.	
Baltimore.....	50,643,159	74,016,846	
Boston.....	86,998,222	80,512,995	
New Orleans.....	12,019,305	726,216	
New York.....	261,921,961	289,177,945	
Philadelphia.....	15,572,776	10,353,116	
CORN, BUSHELS.			
Via—	1896.	1895.	
Baltimore.....	17,075,017	4,853,129	
Boston.....	5,291,555	2,333,342	
New Orleans.....	19,676,703	2,572,362	
New York.....	23,527,779	7,536,379	
Philadelphia.....	2,089,399	730,001	
Via Galveston, Norfolk, Newport News, etc.			
1896.....		19,339,675	
1895.....		6,682,000	

Total shipments from Chicago to the East last week by lake amounted to 71,607 tons, of which 61,248 tons were grain. Total all-rail shipments East, exclusive of live stock, amounted to 52,740 tons, compared with 64,810 for the preceding week, a decrease of 12,070 tons, and against 56,400 tons for the corresponding week of last year. The proportions carried by each road were as follows:

Roads.	WEEK TO JULY 18.		WEEK TO JULY 11.	
	Tons.	p. c.	Tons.	p. c.
Michigan Central.....	5,270	10	5,380	8.3
Wabash.....	5,460	10.3	8,175	12.6
Lake Shore & Mich. South.	6,291	11.9	8,196	12.7
Pitts., Ft. Wayne & Chicago.	6,86	12.9	7,118	11.0
Pitts., Cin., Chi. & St. Louis.	5,225	9.9	6,739	10.4
Baltimore & Ohio.....	4,396	8.5	7,572	11.7
Chicago & Grand Trunk....	6,923	13.1	7,469	11.8
New York, Chi. & St. Louis.	5,178	9.8	5,597	8.6
Erie.....	5,513	10.4	6,539	9.8
C., C. & St. Louis.....	1,679	3.4	2,065	3.1
Totals.....	52,740	100.0	61,810	100.0

Of the above shipments 4,309 tons were flour, 17,335 tons grain, 10,932 tons cured meats and 9,434 tons dressed beef.